Server HX4100/HX6100

User's Guide

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Safety Notices

- **Caution:** To reduce the risk of electric shock which could cause personal injury, follow all safety notices. The symbols shown are used in your documentation and on your equipment to indicate safety hazards.

- **Warning:** Lithium batteries can be dangerous. Improper handling of lithium batteries may result in an explosion. Dispose of lithium batteries as required by local ordinance or as normal waste if no local ordinance exists.

- **Warning:** The detachable power supply cord is intended to serve as the disconnect device.

- **Warning:** This equipment has up to three 3-wire, grounded power cords. To prevent electrical hazards, do not remove or defeat the ground prong on the power cords. Replace the power cord if it gets damaged. Contact your dealer for an exact replacement.

  In the U.S.A. and Canada, the power cord must be a UL-listed detachable power cord (in Canada, CSA-certified), type ST or SJT, 16 AWG, 3-conductor, provided with a molded-on NEMA type 5-15 P plug cap at one end and a molded-on cord connector body at the other end. The cord length must not exceed 9 feet (2.7 meters).

  Outside the U.S.A. and Canada, the plug must be rated for 250 VAC, 10 amp minimum, and must display an international agency approval marking. The cord must be suitable for use in the end-user country. Consult your dealer or the local electrical authorities if you are unsure of the type of power cord to use in your country. The voltage change is auto-sensed by the power supply.

- **Warning:** Under no circumstances should the user attempt to disassemble the power supply. The power supply has no user-replaceable parts. Inside the power supply are hazardous voltages that can cause serious personal injury. A defective power supply must be returned to your dealer.

Safety Notices for Users Outside of the U.S.A. and Canada

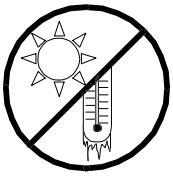
- **PELV (Protected Extra-Low Voltage) Integrity:** To ensure the extra-low voltage integrity of the equipment, connect only equipment with mains-protected electrically-compatible circuits to the external ports.

- **Remote Earths:** To prevent electrical shock, connect all local (individual office) computers and computer support equipment to the same electrical circuit of the building wiring. If you are unsure, check the building wiring to avoid remote earth conditions.

- **Earth Bonding:** For safe operation, only connect the equipment to a building supply that is in accordance with current wiring regulations in your country. In the U.K., those regulations are the IEE.

Care and Handling

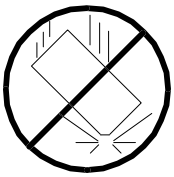
Use the following guidelines to properly handle and care for your system.



Protect the system from extremely low or high temperatures. Let the system warm (or cool) to room temperature before using it.

Keep the system away from magnetic forces.

Keep the system dry. Do not wash the system with a wet cloth or pour fluid into it.



Protect the system from being bumped or dropped.

Check the system for condensation. If condensation exists, allow it to evaporate before powering on the system.

Keep the system away from dust, sand, and dirt.

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Chapter 1

Introduction

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This guide tells you how to configure and upgrade your server. Its goal is to familiarize you with your server and the tasks necessary for system configuration and upgrading.

Organization

Chapter 1

Introduction—Introduces you to the purpose and structure of this guide.

Chapter 2

Features—Gives you an overview of the server and describes major system components.

Chapter 3

Setup—Tells you how to select a site, unpack the system, get familiar with the system, make cable connections, and power on the system.

Chapter 4

Configuring Your System— Tells you how to configure the system and provides instructions for running the Resource Configuration Utility (RCU), the BIOS Setup Utility and the SCSISelect Utility. Chapter 4 also tells you how to configure system board jumpers to set specific operating parameters.

Chapter 5

Upgrades and Options—Provides you with instructions for upgrading your system with optional memory, options cards, and peripheral devices.

Chapter 6

Problem Solving—Contains helpful information for solving problems that might occur with your system.

Appendix A

System Cabling—Includes cabling information for your system.

Appendix B

Memory Configurations—Defines the allowable memory configurations for your system.

Glossary—Defines the standard acronyms and technical terms used in this manual.

Equipment Log—Provides you with a sample equipment log for documenting the system configuration and updates.

Notational Conventions

The notational conventions listed below are used throughout this manual.

F1

A letter, number, symbol, or word in CAPs represents a key on your keyboard. For example, the instruction press F1 means press the key labeled F1 on your keyboard.

ENTER

The ENTER key is interchangeably used as RETURN and CARRIAGE RETURN.

CTRL + ALT

Two or three key names, separated by plus sign (s), indicate multiple-key entries. For example, CTRL + ALT + DEL means hold down the CTRL and ALT keys and press the DEL key.

The special notices listed below are used throughout this manual to emphasize specific information:

Warning: Warning indicates a hazard that can cause serious personal injury or death if the hazard is not avoided

Caution: Caution indicates a hazard that might cause personal injury

Notice: Notice indicates the potential to damage equipment or data is present if the user does not take the necessary precautions recommended by the Notice.

Note: Notes are used to identify or amplify a point to the reader. A Note may be used to emphasize a recommended sequence of steps.

Chapter 2

Features

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Overview

The server is a modular, multiprocessing server based on the Intel® Pentium® Pro chip set. The chip set incorporates a modular scaleable architecture that integrates a 64-bit bus interface with three Peripheral Component Interconnect (PCI) buses and an Industry Standard Architecture (ISA) bus. The architecture supports Symmetrical Multiprocessing (SMP) and a variety of operating systems. The chassis and system boards are designed to meet the needs of the server marketplace.

The combination of computing performance, memory capacity, and integrated I/O provides a high performance environment for many applications including network servers and multi-user systems. The server is designed for use in applications where downtime must be minimized. To this end, the server includes or has the option to include the following:

- Power system redundancy; in a system configured with redundant power supplies, the system will continue to operate with a single power supply failure.
- Self-contained power supply units that can be easily installed or removed from the back of the chassis.
- Hot-swap SCSI hard drive bays accessible from the front of the chassis; a failed drive can be removed and a new drive installed without system power being turned off, if a Redundant Array of Independent Disks (RAID) controller module is installed.
- High degree of SCSI hard disk fault tolerance and advanced disk array management features through the use of RAID (Redundant Array of Independent Disks) technology, if a Redundant Array of Independent Disks (RAID) controller is installed.
- Hardware monitors (temperature and voltage) and software monitors to indicate failures.
- Easy access to all parts for service.

System Feature Summary

The following provides a summary of the system features:

Feature	Description
Modular board set	System is intended for use with a modular board set based on Pentium Pro processor technology; from one to six processors and up to 4 GB of memory.
Add-in board support	Rail and back panel slots support up to 11 add-in boards (two ISA and nine PCI).
3 1/2-inch diskette drive	3 1/2-inch diskette drive is externally accessible.
One location for a 3 1/2-inch removable media device	One externally accessible 3 1/2-inch half-height bay is available for server expansion.
5 1/4-inch SCSI CD-ROM	5 1/4-inch CD-ROM drive is externally accessible.
Three locations for 5 1/4-inch removable media devices	Three externally accessible 5 1/4-inch half-height bays are available for server expansion (diskette, CD-ROM, and/or tape drives).
12 locations for 3 ½-inch SCSI-2 hard drives	From one to three hard disk drive cages; each holding up to four 3 ½-inch hot-swappable ultra wide SCSI-2 hard drives. Each cage is secured behind a metal EMI door; drives can be swapped in or out of the system without powering it down, if a Redundant Array of Independent Disks (RAID) controller module is installed. The array of drives allows easy setup of optional RAID applications.
Hot swap-capable backplane	A hot swap-capable backplane is part of each drive cage assembly for SCSI hard drives. The backplane is designed for wide ultra SCSI-2 devices that use the industry standard 80-pin Single Connector Attach (SCA) connector. The backplane consists of a row of four drive connectors.
Power supply	From one to three 420 Watt autoranging power supplies are easily removed/installed for service. In a three-supply system, the third supply is redundant. In a two-supply system, the second supply can be redundant, depending on the system configuration.
Software: utilities, setup	BIOS Setup, Resource Configuration Utility, and SCSISelect Utility. The EXPRESSBUILDER CD-ROM contains the setup utilities and the ESMPRO CD-ROM contains the server management software.

Security	Mechanical: Key lock at the front door. One intrusion sensor for front door to secure diskette, hard disk, removable media device, power on/off switch, reset switch, top cover, and left/right panel access. Three power interlock sensors one on each side of the chassis and one on top of the chassis. BIOS: Password enable.

Expanding the Server as Needs Grow

The following two subsections describe the typical minimum system configuration and expanded system capabilities of the HX4100 and HX6100 servers.

HX4100

The typical minimum system configuration of the HX4100 server could include the following:

- Board set consisting of system I/O board, CPU base board with 128 MB memory, and two dual CPU boards with one Pentium® Pro microprocessor on the first (primary) CPU board.
- Diskette drive and SCSI CD-ROM drive
- SCSI hard drive cage with one hard drive
- Network add-in boards
- A 420 Watt power supply
- Onboard 1 MB video memory
- System I/O board has two ISA slots and nine PCI slots for add-in boards. The system I/O board also has a riser board for external I/O (serial, parallel, video) interfaces.
- Chassis can hold six removable media drives: four 5 1/4-inch half-height bays with a CD-ROM reader already installed in one bay; and two 3 1/2-inch half-height bays with a diskette drive already installed in one bay.

As server/client needs grow, you can expand system processor capacity, memory, drives, option cards, and the number of power supplies.

- CPU base board has two slots for dual CPU boards. Each dual CPU board may contain up to two processors, for a configurable range of one, two, three, or four processors.
- System I/O board has a video memory upgrade socket for an additional 1 MB of video memory.
- CPU base board supports 16 DIMM devices for a minimum memory size of 128 MB; maximum is 4 GB.
- System I/O board has eleven option board slots (two ISA and nine PCI).
- Chassis can hold six removable media drives.
- Chassis supports up to three SCSI hard drive cages for a total of 12 hot-swap bays for 3 1/2-inch ultra wide SCSI-2 hard drives.
- Chassis supports up to three power supplies. The second or third power supply can be added to provide redundant power. A second power supply must be added if a second processor or SCSI hard drive cage is added.

HX6100

The typical minimum system configuration of the HX6100 server could include the following:

- Board set consisting of system I/O board, CPU base board with 256 MB memory, and two triple CPU boards with two Pentium® Pro microprocessors on the first (primary) CPU board.
- Diskette drive and SCSI CD-ROM drive
- Three SCSI hard drive cages with one hard drive and a RAID controller is installed
- Network add-in boards
- Three 420 Watt power supplies. The third power supply provides redundant power.

- Onboard 2 MB video memory
- System I/O board has two ISA slots and nine PCI slots for add-in boards. The system I/O board also has a riser board for external I/O (serial, parallel, video) interfaces.
- Chassis can hold six removable media drives: four 5 1/4-inch half-height bays with a CD-ROM reader already installed in one bay; and two 3 1/2-inch half-height bays with a diskette drive already installed in one bay.

As server/client needs grow, you can expand system processor capacity, memory, drives, option boards, and the number of power supplies.

- CPU base board has two slots for triple CPU boards. Each triple CPU board may contain up to three processors, for a configurable range of two, three, four, five, or six processors.
- CPU base board supports 16 DIMM devices for a minimum memory size of 256 MB; maximum is 4 GB.
- System I/O board has eleven option board slots (two ISA and nine PCI).
- Chassis can hold six removable media drives.
- Three SCSI hard drive cages support up to 12 hot-swap bays for 3 1/2-inch ultra wide SCSI-2 hard drives.

Configuration Constraints

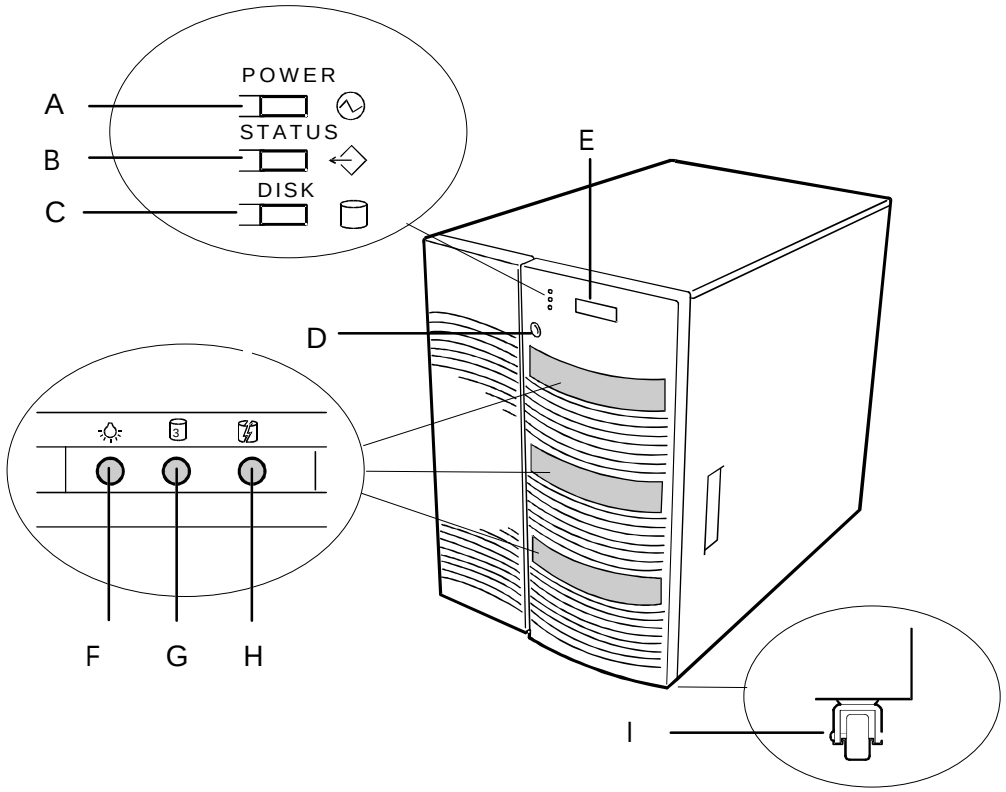
Power supplies are easily removed and installed. The second or third power supply may provide redundant power so that if one of the power supplies fail, the system will continue to operate and the failed power supply can be hot swapped. That is, the failed power supply is removed and replaced without turning power off. The second power supply is required with more than one processor or SCSI hard drive cage is used. In this case, a third power supply is required for redundancy.

The system has four 5 1/4-inch half-height bays accessible from the front. These bays are convenient for diskette, tape, and CD-ROM drives (removable media). Because of the EMI generated by hard drives, the increased susceptibility to ESD, and cooling requirements, hard drives should not be installed in the 5 1/4-inch half-height bays.

Chassis

Figure 2-1 shows the server front chassis features and controls.

Figure 2-1. Front Chassis Features And Controls



A Power LED — When green, power is present in system. When off, power is turned off or power source is disrupted. See Table 2-1 for a list and description of the system LEDs.

B	Status LED	When green the system is OK. See Table 2-1 for a list and description of the system LEDs.
C	Disk LED	When green, internal disk drives are being accessed. See Table 2-1 for a list and description of the system LEDs.
D	Key lock	Secures both front external doors.
E	LCD panel	Displays information about BIOS and system failures (error and diagnostic information).
F **G** **H**	Left to right: Drive present/power on; drive active; drive faulty.	Each drive has three LEDs visible above the bay from the front. See Table 2-2 for a list of SCSI disk drive status LED indicators.
I	Casters (4)	Used when moving the server. Fixed by the caster holders.

Status LED Indicator Descriptions

Table 2-1 lists the system status LED indicators along with a description of each LED indicator. Table 2-2 lists the disk drive status LED panel indicators along with a description of each LED indicator.

Table 2-1. System Status LED Indicators

LED	Status	Description	Response
Power	Off	Power OFF	None required (normal)
	Green	Power ON	None required (normal)
	Amber	System power supply failure	Replace failed power supply module.
Status	Off	Power OFF	None required (normal)
	Green	No alarms	None required (normal)
	Amber	Abnormal condition (see Table 2-3).	Check condition.
Disk	Off	Not accessing disk drives	None required (normal)
	Amber	Internal disk drive failure	Check disk drive status LEDs
	Green	Accessing disk drives	None required (normal)

Table 2-2. Disk Drive Status LED Panel Indicators

LED	Status	Description	Response
Disk Drive Present	Off	Disk drive not present	None required (normal)
	Green	Disk drive present	None required (normal)
Disk Drive Activity	Off	Not accessing disk drive	None required (normal)
	On	Accessing disk drive	None required (normal
Disk Drive Status	Off	No alarms	None required (normal)
	Amber	Disk drive failure	Replace disk drive.

Table 2-3. System Status Abnormal Conditions

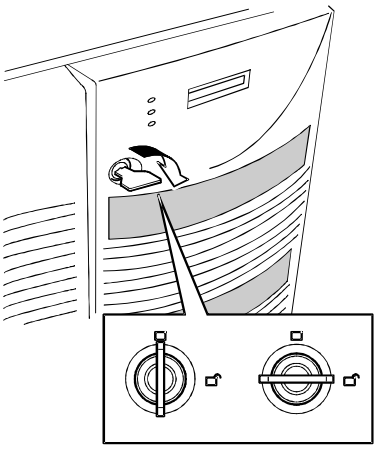
LED (Amber)	Conditions
System Status	Chassis intrusion (front cover) Unit fan alarm Memory multi-bit error (SERR) P6 bus error (SERR) Thermal sensor Temperature Voltage CPU thermal trip PCI PERR# (OPB/ESC detect) PCI SERR# CPU internal error WDT IOCHK

Opening the Front Doors

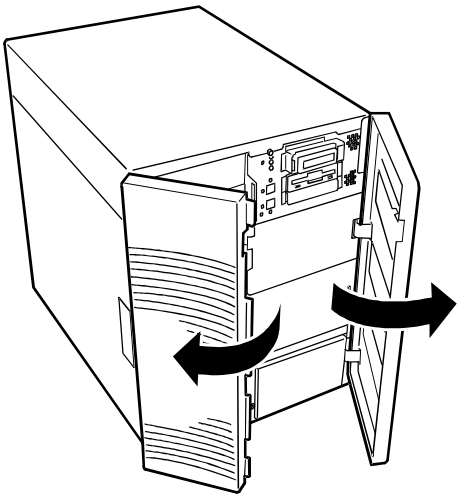
You must open the right front door to turn the server power on or off, reset the server, mount or dismount a floppy disk, or mount or dismount a hard disk drive. Open the left front door to mount or dismount 5 1/4-inch removable media devices.

To open the front doors:

1. To open the front doors, you need to use the security key provided with the server. Insert the security key into the key slot and turn the key to the right.



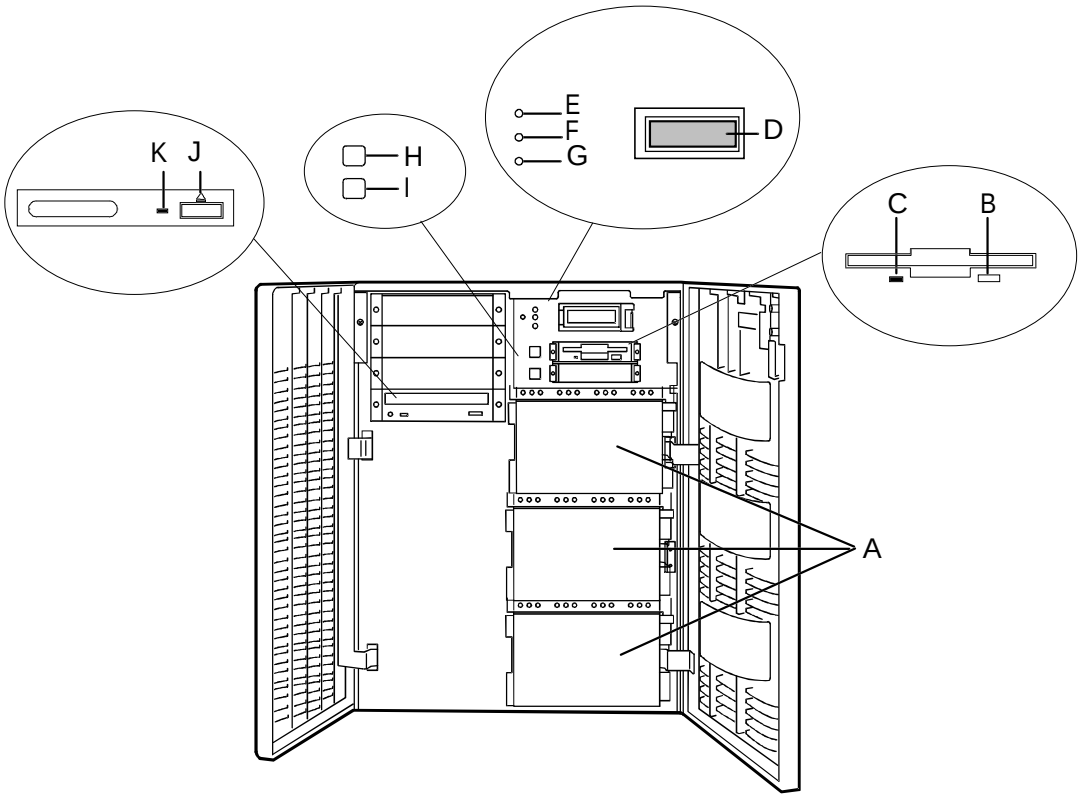
2. First open the right front door, then open the left door.



Chassis Front Features and Controls

Figure 2-2 shows the server front chassis features and controls with front doors opened.

Figure 2-2. Front Chassis Features And Controls (with front doors opened)



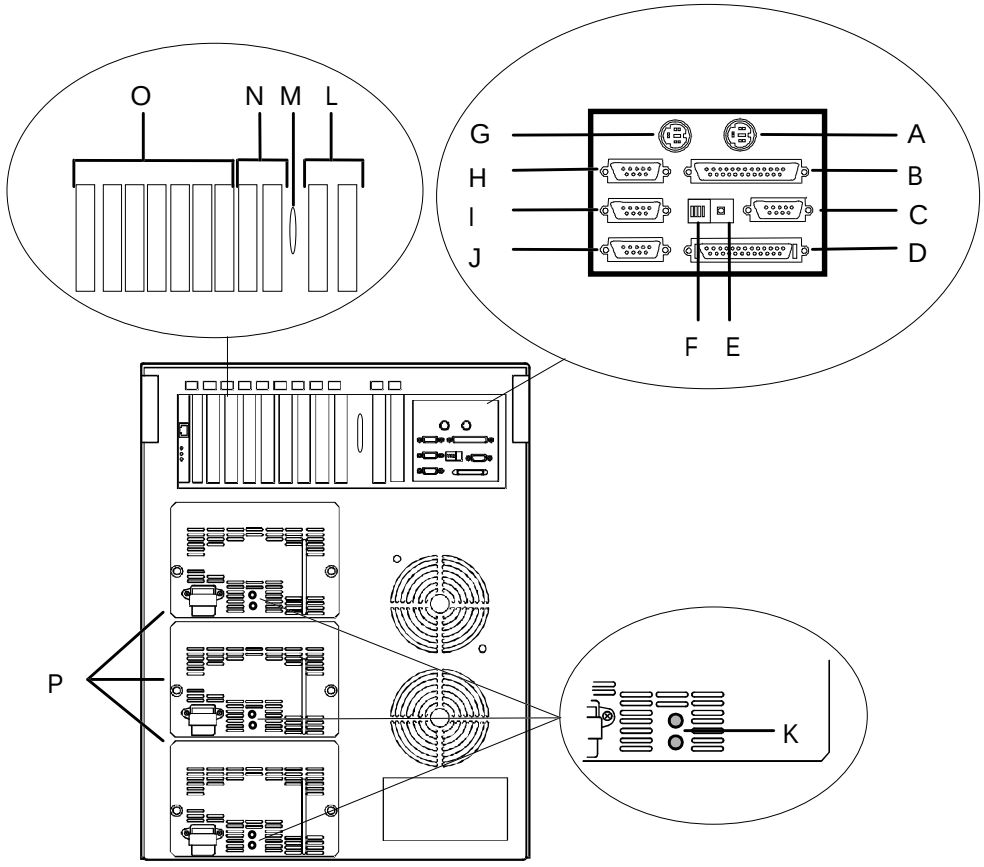
A	SCSI hard drive cages	Used to mount the hard disks. Each cage contains four disks with their three status LEDs mounted above.
B	Ejector button, 3 1/2-inch diskette drive	Press to eject diskette.
C	Activity light, 3 1/2-inch diskette drive	When lit, drive is in use.
D	LCD panel	Displays information about BIOS and system failures (error and diagnostic information).

E	Power LED	When green, power is present in system. When off, power is turned off or power source is disrupted. See Table 2-1 for a list and description of the system LED indicators.
F	Status LED	When green the system is OK. See Table 2-1 for a list and description of the system LED indicators.
G	Disk LED	When green, internal disk drives are being accessed. See Table 2-1 for a list and description of the system LED indicators.
H	DC power switch	Press to turn system DC power on or off.
I	Reset switch	Press to cause a hard reset to the system; the power-on self test (POST) will run.
J	Load/eject button, CD-ROM reader	Press to load CD and eject CD.
K	Activity light, CD-ROM reader	When lit, drive is in use.

Chassis Rear Features and Controls

Figure 2-3 shows the server rear chassis features and controls.

Figure 2-3. Rear Chassis Features and Controls



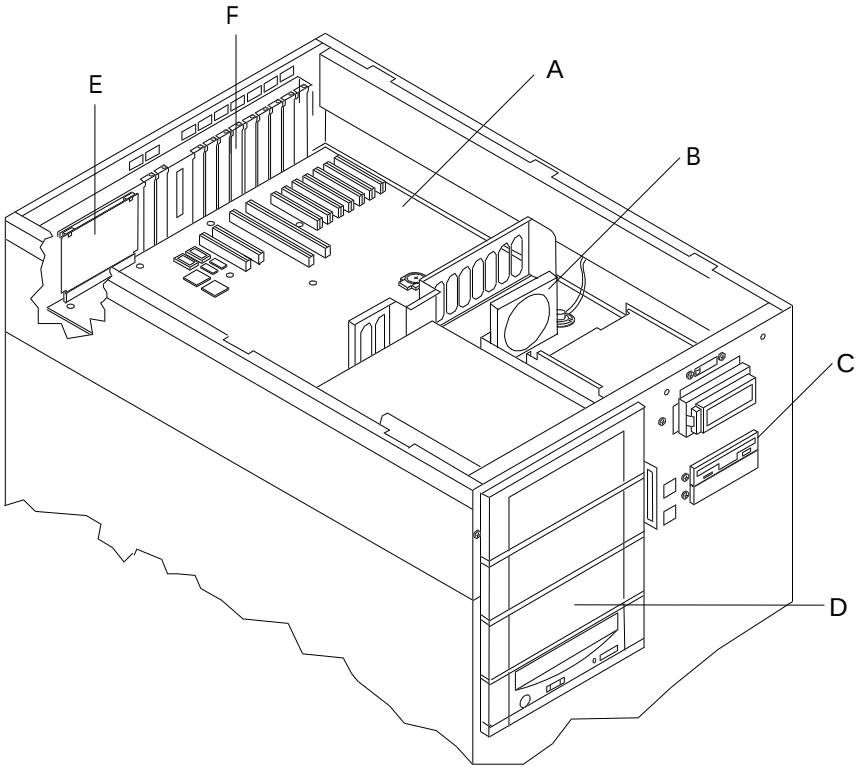
A	Keyboard	PS/2-compatible 6-pin mini-DIN connector.
B	Printer	LPT1 25-pin parallel port connector.
C	VGA	VGA monitor 15-pin connector.
D	External-SCSI	Narrow-SCSI 50-pin connector
E	Dump button	See *Configuring Switch and Jumper Settings* in Chapter 4 of this User's Guide.
F	Function select switches	See *Configuring Switch and Jumper Settings* in Chapter 4 of this User's Guide.
G	Mouse	PS/2-compatible 6-pin mini-DIN connector.
H	COM1	COM1 serial port 9-pin connector.
I	COM2	COM2 serial port 9-pin connector.

J	—	Reserved.
K	Power status LEDs	Both indicators are green during normal operation. Either or both indicators go off when power supply fails. See Table 2-4 for status descriptions.
L	PCI slots	Two PCI add-in board slot locations (PCI #11 and PCI #12).
M	Knockout	Available to route SCSI signals to peripheral boxes.
N	ISA slots	Two ISA add-in board slot locations (ISA #1 and ISA #2).
O	PCI slots	Seven PCI add-in board slot locations(PCI #21, PCI #22, PCI #23, PCI #31, PCI #32, PCI #33, and PCI #34).
P	Power supplies (three shown)	Possible configurations, installed from bottom most bay: 1 supply (nonredundant) 2 supplies (redundant if system has only one processor and one SCSI hard drive cage; nonredundant if more than one processor and one hard drive cage) 3 supplies (one redundant) Each power supply has a separate AC input power connector.

System Board Features

The board set includes the system I/O board, one CPU base board, and two CPU boards (either dual or triple). The system I/O board is mounted at the top of the system Figure 2-4 shows the system with the top cover removed.

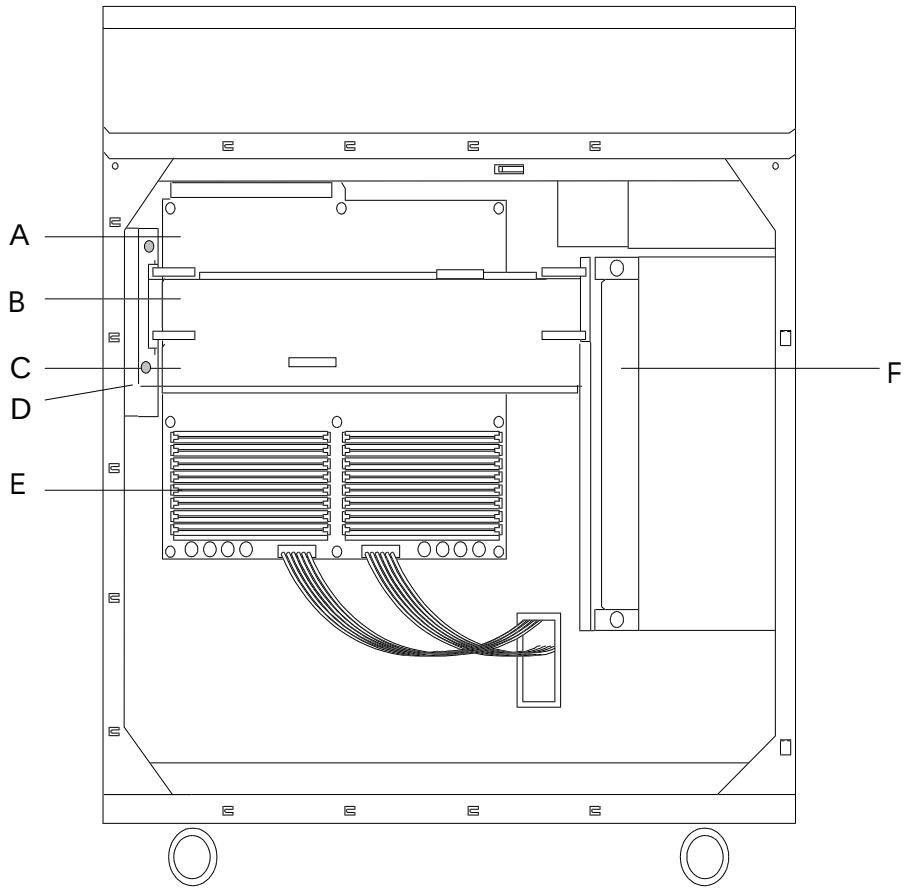
Figure 2-4. System I/O Board Location



A	System I/O Board
B	Option board Fan
C	Diskette drive
D	Four 5 1/4-inch half-height bays with a CD-ROM reader already installed in bottom bay
E	I/O riser board
F	Expansion slot covers

The CPU base board plugs into the underside of the system I/O board and the CPU boards plug into the CPU base board. Figure 2-5 shows the system with the left side cover removed.

Figure 2-5. CPU Base Board and CPU Board Location

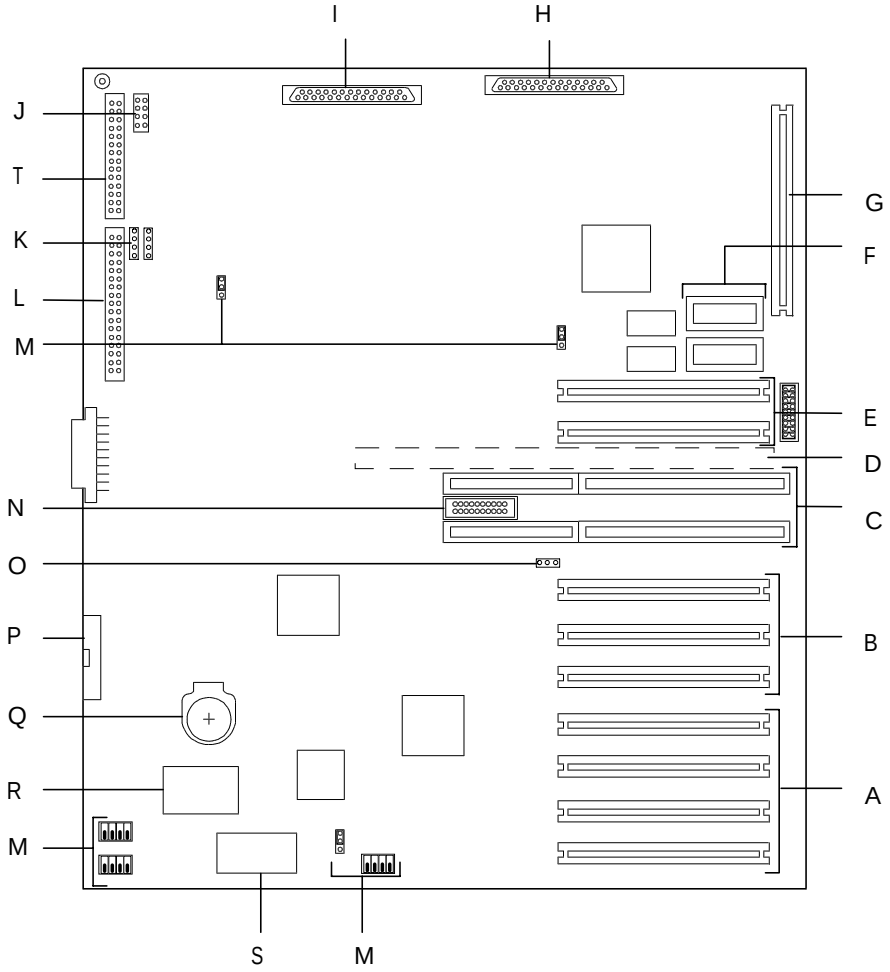


A	CPU base board
B	CPU board #1 (primary)
C	CPU board #2 (secondary)
D	Rear CPU fan
E	Memory DIMMs
F	Front CPU fan

Figures 2-6, 2-7, and 2-8 show the major components on the system I/O board, CPU base board, and CPU boards, while the following summarizes the board set features.

Board set summary	Feature description
Multiple processor support	Two CPU boards. Either two or three processor sockets, for a total of either four or six processors.
Upgradable memory	Sixteen DIMM sockets on the CPU base board, supporting up to 4 GB memory using 256 MB DIMMs.
Add-in board support	Two dedicated ISA bus slots and nine dedicated 32-bit PCI slots on the system I/O board.
SCSI controller	Dual onboard SCSI-2 controller (PCI-based).
BIOS	Flash memory-based BIOS (Basic Input/Output System) and Setup utilities.
Video	Integrated super VGA controller ships with either 1 MB or 2 MB of video memory. Upgrade socket (1 MB) is available for 1 MB system to increase total video memory size to 2 MB.
External device connectors	Onboard connectors for two serial ports, parallel port, narrow SCSI port, PS/2-compatible keyboard and mouse, and VGA monitor.
Clock	Real-time clock/calendar (RTC).
System hardware monitoring	Detects chassis intrusion and contains sensors for temperature, voltage, and fan failure.
Configuration utilities	Resource Configuration Utility (RCU) and SCSISelect Utility.

Figure 2-6. System I/O Board Connector and Component Locations



A PCI expansion slots (#31, #32, #33, and #34)

B PCI expansion slots (#21, #22, and #23)

C ISA expansion slots (#1 and #2)

D CPU base board connector (underside of board)

E PCI expansion slots (#11 and #12)

F Optional Video DRAM sockets

G I/O riser board connector

H SCSI channel B connector

I SCSI channel A connector

J SCSI status cable connector

K Option board fan connector

L Front panel connector

M Configuration jumpers

N Reserved

O Reserved

P Diskette connector

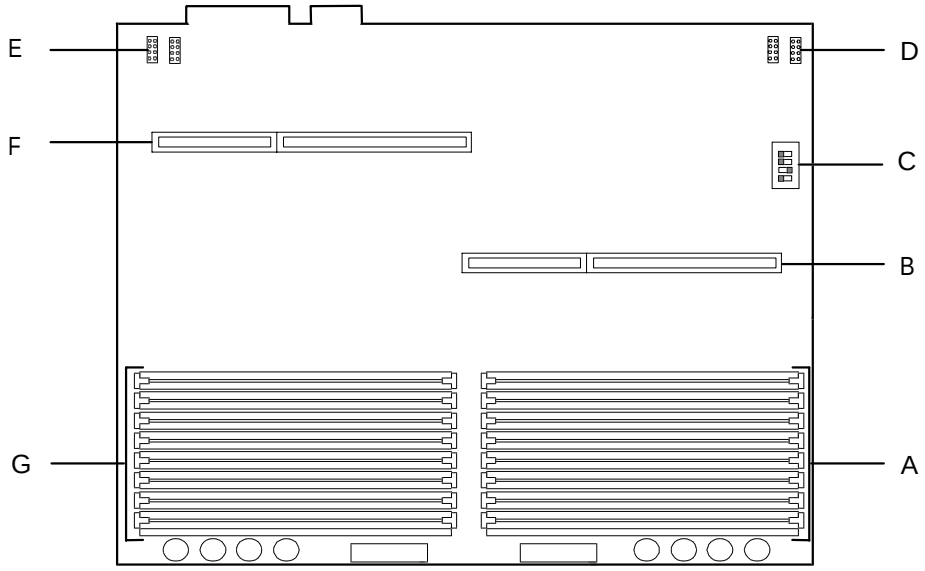
Q Real time clock battery

R Flash board

S Non-volatile memory

T Power status cable connector

Figure 2-7. CPU Base Board Component Locations



A DIMM sockets (bank #1, #3, #5, and #7)

B CPU board #2 connector

C Configuration switch

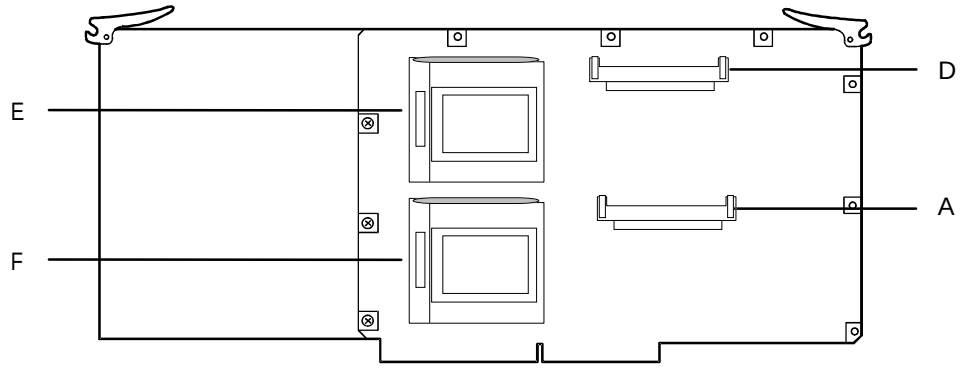
D CPU front fan connector

E CPU rear fan connector

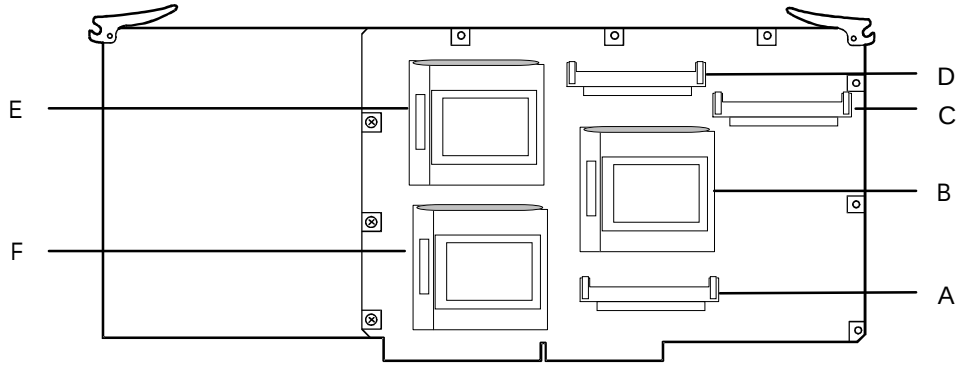
F CPU board #1 connector

G DIMM sockets (bank #2, #4, #6, and #8)

Figure 2-8. Dual and Triple CPU Board Component Locations



a. Dual CPU Board



b. Triple CPU Board

A Voltage module socket for processor #1

B Processor #3

C Voltage module socket for processor #3

D Voltage module socket for processor #2

E Processor #2

F Processor #1

Processor

The system includes two CPU boards containing Pentium Pro processor sockets and voltage module sockets to power each processor (Figure 2-8). The CPU boards are either dual CPU boards capable of supporting up to two processors or triple CPU boards capable of supporting up to three processors. The Pentium Pro processors plug into a Zero Insertion Force (ZIF) sockets on these boards. Additional Pentium Pro processors enhance performance and enable symmetric multiprocessing (SMP). All processors access the same memory and I/O space and tasks can run on either CPU if your operating system (OS) supports SMP.

Memory

The CPU base board contains sixteen 168-pin DIMM sockets (Figure 2-7, A and G). A minimum system configuration includes 128 MB (using two 64 MB DIMMs) of system memory. 16 DIMM sockets allow for system memory expansion to 4 GB (using sixteen 256 MB DIMMs). ECC generation/checking is provided for detection and correction of memory errors.

Note: Only use DIMMs approved for use in this server system. Call your customer service representative for information.

Bus Master I/O Expansion Slots

The server's expansion capabilities meet the needs of high performance I/O servers by providing a combination of PCI local bus and ISA connectors. The system I/O board offers nine dedicated PCI slots and two dedicated EISA slots.

The system I/O board contains two ISA bus master I/O (input/output) expansion slots (Figure 2-6, C). The ISA architecture supports 32-bit memory addressing and 16-bit data transfers for the CPU, DMA, and bus masters.

The system I/O board also contains nine PCI bus master I/O expansion slots (Figure 2-6, A, B, and E).

Real-Time Clock/Calendar

The real-time clock provides system clock/calendar information stored in a non-volatile memory (NVRAM). The real-time clock battery (Figure 2-6, Q) provides power backup for the real-time clock.

BIOS

A BIOS and Setup Utility are located in the Flash memory (Figure 2-6, R) on the system I/O board and include support for system setup and PCI/ISA Plug-and-Play auto-configuration. A number of security, reliability, and management features also have been incorporated to meet vital server needs.

Video

The onboard super VGA controller (PCI) is a high-performance SVGA subsystem that supports:

- BIOS compatibility with VGA, EGA, CGA, Hercules Graphics, and MDA.
- 1 MB of Video Memory expandable to 2 MB (Figure 2-6, F).
- 16-bit bus for high-speed display memory access.
- Hardware accelerated bit block transfers (BITBLT).
- Supports 72Hz refresh, non-interlaced at: 640x480, 800x600, or 1280x1024 resolutions.
- Displays of up to 16M colors at 640x480 and 800x600 resolutions, 64K colors at 1024x768 resolutions and 256 colors at 1280x1024 resolutions with the optional 2 MB video memory.

Note: SVGA drivers may be required to use the high-performance video modes.

SCSI Controller

The system I/O board includes a dual ultra wide SCSI-2 controller (Adaptec® AIC-7895) integrated as a PCI bus master. This controller supports data paths of 8-bit (fast/narrow SCSI) at a data transfer rate of 10 MB/sec and 16-bit (fast/wide or ultra /wide SCSI) at a data transfer rate of 20 MB/sec or 40 MB/sec. As a PCI bus master, this controller supports burst data transfer rates up to the maximum of 133 MB/sec.

On this server, channel B is cabled to the four SCSI devices in the removable media drive bays. Channel A is either cabled to the first SCSI hard drive cage or available for optional SCSI devices.

Peripheral Controller

The advanced integrated peripheral controller supports two serial ports and one parallel port through the I/O riser board (Figure 2-6, G). The advanced integrated peripheral controller also supports the connection of two diskette drives (Figure 2-6, P).

External Device Connectors

The I/O panel provides connectors for a PS/2 compatible mouse and a keyboard, connectors for VGA monitor, two serial port connectors, and a parallel port connector. It also provides a narrow SCSI external connector.

Keyboard and Mouse

The keyboard/mouse controller is PS/2™-compatible.

Fans

In addition to the power supply fans, the system has an option board fan (Figure 2-4, B) cabled to the system I/O board (Figure 2-6, K) and two CPU fans (Figure 2-5, D and F) cabled to the CPU base board (Figure 2-7, C and D). The two CPU fans (front and rear) are redundant in configuration. If one fan fails, its associated fan changes its rotating speed to high.

Peripheral Devices

This subsection describes the SCSI-2 hard drive bays and 5 1/4-inch removable media drive bays.

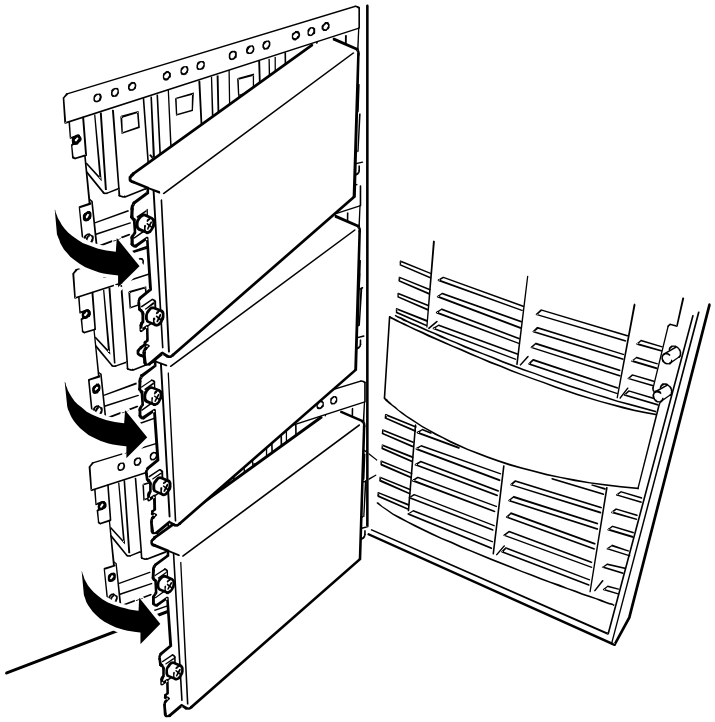
SCSI-2 Hard Drive Bays

The right side of the system can contain up to three SCSI hard drive cages for 3 1/2-inch SCSI-2 hard drives (see Figure 2-9). Each hard drive cage has a hot-swap backplane that supports four drives. The backplanes require an 80-pin single connector attachment (SCA) connector on the drives you install.

A drive carrier is required as part of the hot swap implementation. A 3 1/2-inch peripheral between 1.0 and 1.6 inches high can be accommodated in each carrier. A drive is mounted in the carrier with four fasteners, and the carrier is retained in the chassis by a locking handle.

If your system has RAID, a fault light on the front panel board gives a general indication that there has been a fault on a hot-swap drive. Each drive has a set of three lights to indicate the fault or other status: power-on (green LED), activity (green LED), or fault (yellow LED).

Figure 2-9. SCSI-2 Hard Drive Bays



Three hard drive cages

(EMI panel and exterior door shown open)

The backplane has two main functions: SCSI drive control and system data logging. Drive status is monitored to detect failing drives and to control LED indicators. The backplane features are:

- Inserting and removing of hard drives while power is on (referred to as “hot swap”)
- Simplified cable management
- SCA connectors to simplify inserting and removing hard drives
- SCSI management of fault LEDs.

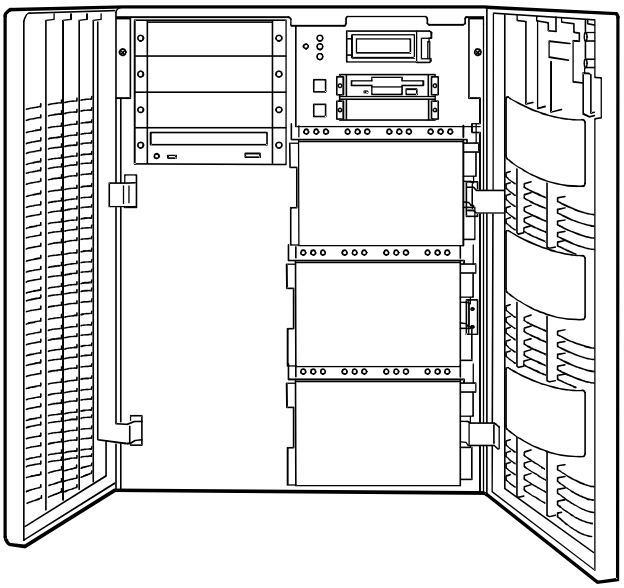
Each backplane supports SCSI drives with SCA connectors.

Removable Media Drive Bays

On the upper left side of the system, four 5 1/4-inch half-height bays (see Figure 2-10) are designed for peripherals with removable media (diskette, CD-ROM, or tape). Two available adjacent 5 1/4-inch bays can be converted to a single full-height bay. The 5 1/4-inch drives can be removed directly from the front of the chassis. Removal of the system top cover may be required to install/remove the device cables. Cosmetic filler panel are installed over all unused 5 1/4-inch bays.

On the upper right side of the system below the LCD panel, there are two built-in 3 1/2-inch bays one of which contains a 3 1/2-inch diskette drive that supports both 720 KB and 1.44 MB media (see Figure 2-10).

Figure 2-10. Removable Media Drive Bays



Factory-installed CD-ROM reader plus three bays for removable media drives.

Factory-installed 3 1/2-inch diskette drive plus second bay for removable 3 1/2-inch drive.

(Exterior doors shown open)

Note: The SCSI termination resistors must be installed in the last SCSI drive of the daisy chain cabling (bottom media bay). All other devices must have terminators removed.

Power System

The system may be configured with up to three 420 Watt power supplies. Each supply automatically switches between these input voltage ranges:

- 100-120 VAC at 50/60 Hz; 7 A maximum current
- 200-240 VAC at 50/60 Hz; 3.5 A maximum current

Each power supply provides these DC outputs: +5 V, +12 V, +3.3 V, -5 V, and -12 V. All output grounds connect to the power supply chassis and to earth ground through the AC line cord. Each supply has the following:

- Individual AC input line cord that plugs into the external side of the power supply.
- An isolating device on each DC output so that the failure of one supply will not affect the operation of the others.
- Cooling fan integral with each power supply enclosure. The fan circuitry implements fan failure detection.

In a system, power is drawn equally from all supplies present. A HX4100 with a single CPU and single SCSI hard drive cage can be configured with a single power supply. A system with two power supplies can be fully loaded (all drive bays and add-in board slots filled). The supplies use a forced current-sharing technique that ensures that the supplies will share within 10 percent at full load. In a high-access system with three power supplies, the third supply gives redundancy, because the load is redistributed if one supply fails.

Software Locks via the BIOS Setup

The BIOS Setup has software features that let you control access to one or more parts of the system:

- Set and enable an administrative password.
- Set and enable a user password.
- Enable password on boot.
- Disable writing to the diskette drive when secure mode is set.

If only a supervisor password is set and enabled: Enter this password to boot the server and run the SCU.

If both the user and administrative passwords are set and enabled: Enter either one to boot the server. Enter the administrative password to access the SCU or BIOS Setup to change the system configuration.

Chapter 3

Setup

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Moving the System to the Installation Location 2
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Selecting a Site

The system operates reliably in a typical office environment. Choose a site that is:

- Near grounded, three-pronged power outlets.

  Note: For the United States and Canada, this means a NEMA 5-15R outlets for 100-120 VAC or NEMA 6-15R outlets for 200-240 VAC. For other international sites, this means three-pronged power outlets applicable for the electrical code of the region.

Caution: Be sure the power service connection is through a properly grounded outlet

  Each power cord can be plugged into a separate phase of a main AC supply, assuming the circuit is rated for that load.

  Note: For Denmark, the system must be connected to an AC power source rated at 16 Amps.

- Clean, dust-free, and well ventilated. Front and rear ventilating openings kept free of obstructions. Away from sources of heat, vibration or physical shock
- Isolated from strong electromagnetic fields and electrical noise produced by electrical devices (such as air conditioners, large fans, large electric motors, radio and TV transmitters, and high-frequency security devices)
- Spacious enough to provide at least five inches (13 centimeters) behind the system and three inches (eight centimeters) on each side of the system for proper cooling, airflow, and cable clearance
- Spacious enough to provide at least 11 inches (27 centimeters) in front of the system for proper front door clearance
- Easily accessible for system maintenance and installation of system upgrades.

Unpacking the System

Caution: Your system weighs approximately 207 pounds (94 kg). To avoid personal injury, make sure you have someone help you lift or move the system

When you receive your system, inspect the shipping containers prior to unpacking. If the shipping boxes are damaged, note the damage, and if possible, photograph it for reference. After removing the contents of the containers, keep the cartons and the packing materials. If the contents appear damaged when you unpack the boxes, file a damage claim with the carrier immediately. To unpack your system, see the unpacking instructions on the shipping carton.

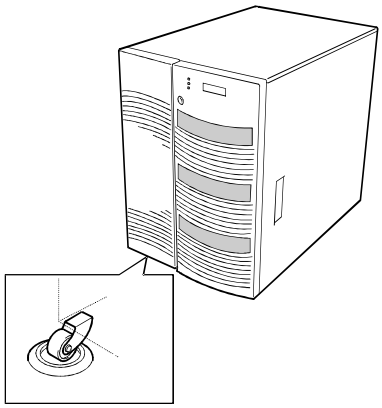
Moving the System to the Installation Location

Once you have selected the server installation site, move the server as follows:

1. Casters are provided on the bottom of the server. Slowly push the server to the selected installation location.

Caution: For safety reasons, be sure to attach the caster holders on the casters when the system is at the selected location

2. To stabilize the server, attach the caster holders on the casters as shown below.



Getting Familiar with the System

Before setting up your system, refer to Chapter 2 in this User's Guide to become familiar with the system's features, such as the location of your system's security keylocks and front and rear panel switches, indicators and connectors, etc.

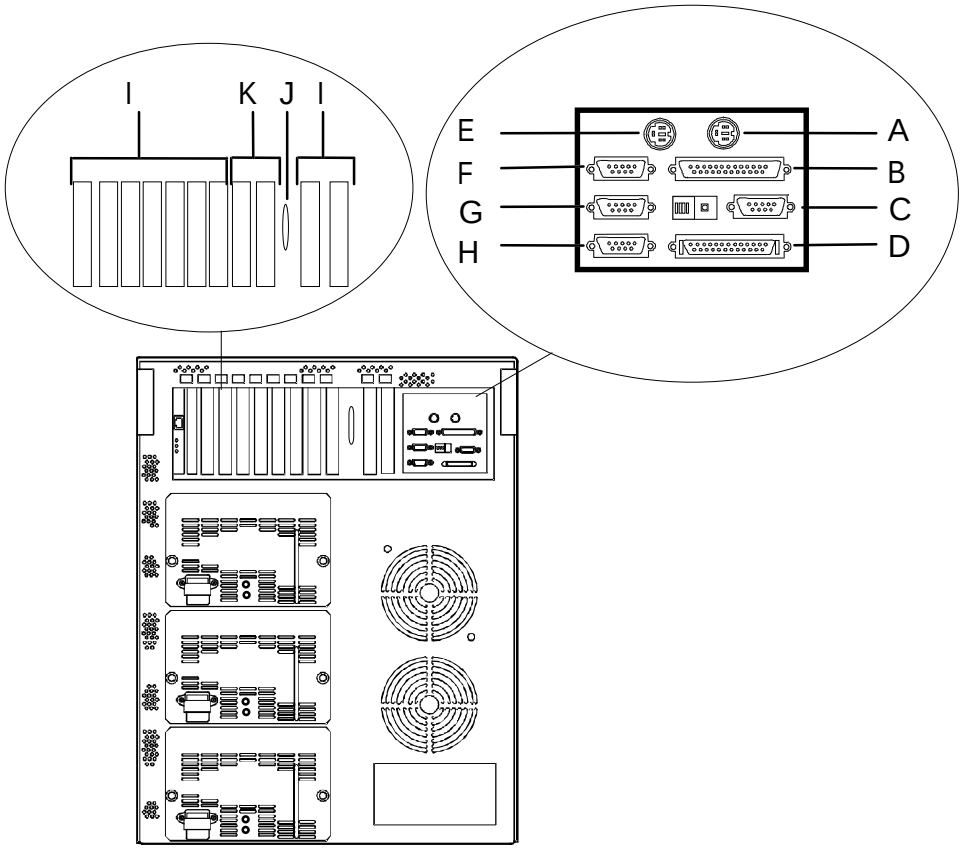
Making Connections

Refer to Figure 3-1 and connect your keyboard, monitor, and mouse. Connect any external peripheral devices such as a printer or modem by following the instructions included with these devices. To connect external SCSI cables, refer to *Cabling* in Appendix A of this User's Guide.

Notice: Damage to the system may result if the keyboard cable is inserted or removed when power is applied to the system.

Caution: Inserting a telephone line connector into a LAN board RJ-45 port may result in personal injury and equipment damage.

Figure 3-1. Making Connections



A. Keyboard, PS/2-compatible 6-pin connector
B. Printer, parallel port 25-pin connector
C. VGA monitor, 15-pin connector
D. External-narrow SCSI, 50-pin high density connector
E. Mouse, PS/2-compatible 6-pin connector
F. COM1, serial port 9-pin connector
G. COM2, serial port 9-pin connector
H. Reserved, 9-pin connector
I. PCI slots, nine PCI add-in board slots
J. Reserved, connector knockout
K. ISA slots, two ISA add-in board slots

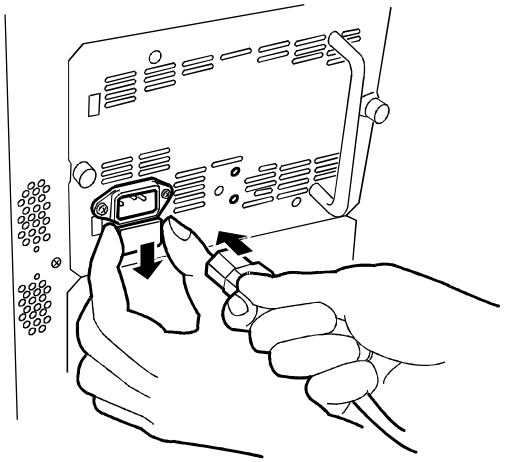
Connecting the Power Cord

Plug the female end of the AC power cords into the input receptacles on the rear of the power supplies (see Figure 3-2). Plug the male end of the power cords into NEMA 5-15R outlet for 100-120 VAC or NEMA 6-15R outlet for 200-240 VAC. If the power cord supplied with the system is not compatible with the AC wall outlet in your region, obtain a suitable power cord that meets the following criteria.

- The power cord must be rated for the available AC voltage and have a current rating that is at least 125% of the current rating of the system.
- The power cord connector that plugs into the wall outlet must be terminated in a grounding-type male plug designed for use in your region. It must have certification marks showing certification by an agency acceptable in your region.
- The power cord connector that plugs into the system must be an IEC- type CEE-22 female connector.
- The power cord must be less than 1.8 meters (6.0 feet) long.

Warning: Your system shipped with a power cord. Do not attempt to modify or use the supplied AC power cord if it is not the exact type required

Figure 3-2. Connecting the AC Power Cord



Powering On Your System

1. Make sure all external devices, such as a video display, keyboard, and mouse (optional) have been connected, and the power cords are connected.

2. Power on the video display and any other external devices.

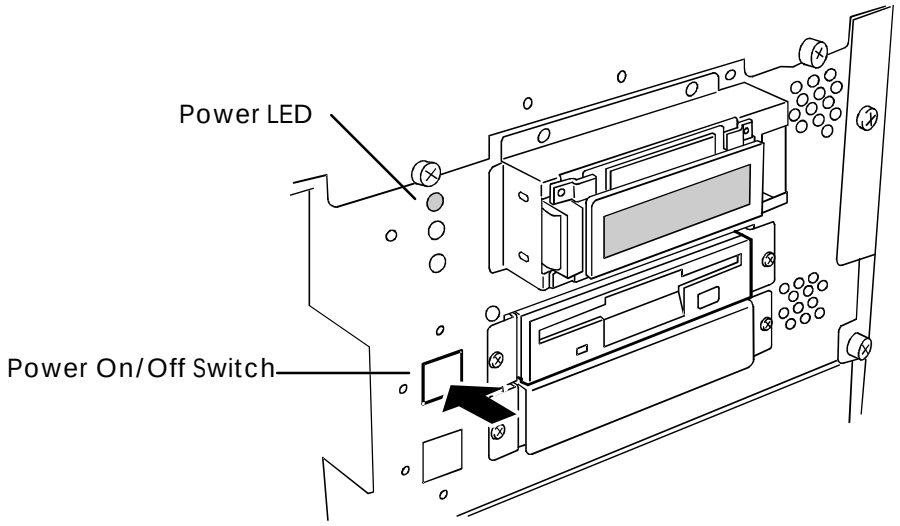
3. Open the right front door and press the power on/off switch on the front panel (see Figure 3-3).

4. Verify that the Power LED is lit. If it is not lit, ensure the ac power cords are connected to a functional ac power source.

After a few seconds your system begins the internal Power-On Self Tests (POST). POST automatically checks the system, CPU module, memory, keyboard, and most installed peripheral devices. If you have problems powering on your system, refer to *Problem Solving* in Chapter 6 of this User's Guide.

After you have successfully powered on your system, verify that the system boots to a DOS prompt. You can now run the EXPRESSBUILDER CD-ROM.

Figure 3-3. Powering On Your System



Chapter 4

Configuring Your System

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Configuring Your System

Configuration and setup utilities are used to change your system configuration. You can configure your system, as well as option boards you may add to your system, using the Resource Configuration Utility (RCU) diskette. Also, several unique system parameters are configured using BIOS Setup which is stored in the system FLASH memory. A diskette is not needed to run BIOS Setup.

The SCSISelect Utility which is also stored in the system FLASH memory is used if you need to configure the SCSI controller in your system or to perform a SCSI disk format or verify disk operation of these drives. A diskette is not needed to run SCSISelect.

A Utilities diskette contains the Event Log Utility. The Event Log Utility is used to read stored system event information.

If your system has been factory configured, the RCU, BIOS Setup, or SCSISelect utilities do not need to be run unless you want to change the password or security features, add option boards or devices, or upgrade the boards in your system.

There are some system configuration parameters that are set by jumpers. However, these parameters do not usually require change. Finally, the EZ-SCSI utility is included with your system. This program performs MS-DOS driver installation for SCSI devices in your system and also installs basic utilities that format and manage SCSI hard disk drives. Refer to the documentation supplied with the EZ-SCSI utility for more information.

This chapter provides procedures for running the RCU, BIOS Setup, and the Utilities diskette. Also, a section describing the system jumper configurations is presented. Several configuration tables are provided in this chapter to record changes you make to the default system configuration.

You use the EXPRESSBUILDER CD-ROM to create the RCU and Utilities diskettes.

Resource Configuration Utility (RCU)

The Resource Configuration Utility is used to configure your system. The RCU can be used to configure the memory subsystem, peripheral device subsystems, and interface adapters. RCU recognizes ISA Plug-and-Play boards and PCI boards and displays their configuration. ISA (non-Plug and Play) adapter boards must be added to the RCU configuration to reserve the resources required by the ISA boards.

After you add options using the RCU, the system automatically configures and initializes them during system initialization at boot up.

The RCU stores the configuration information in the non-volatile memory on your system. When you exit the RCU the configuration information is written to non-volatile memory. The RCU also maintains the Setup configuration, which is stored in the battery-backed memory. This means that when you exit the RCU, the Setup and RCU configuration will agree with each other.

Using the RCU

If you are adding a non-Plug and Play ISA option board, run the RCU before installing the board using procedures found in the *Upgrades and Options* chapter of this guide. If you are upgrading system memory, do so before running the RCU using procedures found in the *Upgrades and Options* chapter of this guide. To use the RCU:

Notice: The system can fail following improper configuration. Always save the current settings before reconfiguring the system.

1. Power on the system.
2. If the diskette drive is disabled, enable it using the BIOS Setup utility, explained later in this chapter. Specify the correct type of diskette drive.
3. Using the EXPRESSBUILDER CD-ROM, create the RCU diskette. Note that the CD-ROM refers to the RCU as the SCU.
4. Start the RCU by rebooting the system, with the RCU diskette in Drive A. When the RCU banner is displayed, press ENTER and the Resource Configuration Utility Main Menu shown in Table 4-1 is displayed.
5. Select *Learn about configuring your computer* from the RCU Main Menu and press ENTER if you need information on system configuration. Read through the information and press the F10 key when you are done.
6. Using the ↑ and ↓ arrows highlight *Configure Computer* and press ENTER. The Resource Configuration Utility Menu shown in Table 4-2 displays. The keys that are active while viewing a screen are displayed on the bottom of the screen.

   Note: Press the F1 key at any time for help and additional information on each option. To return from help, press the ESC key.

Table 4-1. Resource Configuration Utility Main Menu

MENU OPTIONS	DESCRIPTION
1. Learn about configuring your computer	Provides basic instructions on system configuration and using the Help program.
2. Configure computer	Lists automatically detected boards, and enables manually adding, moving and removing boards. Plug-and-Play boards don't require configuration files. If the ISA board requires configuration files, use "Add or remove boards" for a menu to enter or change ISA board configurations. (Refer to ISA Board Configuration found later in this chapter). INSERT adds a board not detected or has not been installed. DEL removes a selected board. F7 moves a selected board to a different slot.
3. Set date	Enables viewing and changing the date that the computer uses.
4. Set time	Enables viewing and changing the time that the computer uses.
5. Maintain system configuration diskette	Enables viewing and changing Configuration (.CFG) files and System Configuration Information (SCI) files.
6. Exit from this utility	Exits from the RCU.

Table 4-2. Resource Configuration Utility Menu

MENU OPTIONS	DESCRIPTION
Step 1. Important System configuration information.	Provides information on the Resource Configuration program and how it differs from ISA board configuration.
Step 2. Add and remove boards	Lists automatically detected boards, and enables manually adding, moving and removing boards. Plug-and-Play boards don't require configuration files. This list shows all the boards and options that will be installed in your system.
Step 3. View and Edit Details	Enables viewing and changing your system configuration settings including embedded features, functionality, IRQs, and port selections. Perform Step 3 only if you need to change the system default settings.
Step 4. Examine Switches or Print Report	Enables viewing the required switch and jumper settings and allows printing of a configuration report.
Step 5. Save and Exit	Allows you to save your configuration and exits to the operating system. You can also exit without saving.

7. Select Step 1: Important System Configuration information and press ENTER to learn more about the Resource Configuration Utility.

8. Select Step 2 to add an ISA board to your system. Refer to "ISA Board Configuration" in this chapter.

9. Select Step 3 to view your systems configuration settings. The normal (default) RCU settings are shown in Table 4-3.

RCU Command Line Parameters

There are RCU options that can be enabled by starting the RCU from the command line with the appropriate switch listed below. To enable an option, insert the RCU diskette in drive A and type `A:SD` at the MS-DOS prompt, followed by one of these command line parameters:

H High resolution display. Sets the display mode to 43 lines for an EGA add-in video controller board or to 50 lines for a VGA board. The default is 25 lines for all add-in video controller boards.

M Monochrome display. The display screens are shown using monochrome attributes, even on a color display. The default is to display color, unless a monochrome video display is detected. Use this parameter when you have redirected the console to one of the onboard serial ports.

RCU Configuration Settings

Table 4-3 shows the recommended RCU settings for a sample system and provides a place for you to record any changes you make to the settings. To display the configuration settings, select Step 3 under the Resource Configuration Utility Menu. To edit any of the configuration parameters, use the up and down arrows to highlight the desired configuration parameter and press ENTER. Pressing F6 at this point, allows you to edit any of the parameters resources (IRQs, DMAs, I/O ports or memory).

Table 4-3. RCU Configurations

MAIN MENU	NORMAL SETTING	YOUR CONFIGURATION
System - Express 5800 HX4100/HX6100 System Board		
RS - 232 COM Port 1	PORT 3F8h - 3FFh IRQ 4	
RS - 232 COM Port 2	PORT 2F8h - 2FFh IRQ 3	
Parallel Port	PORT 378h - 37Fh IRQ 7	
Floppy Controller	Enabled	
Mouse Controller	Enabled	
PCI-2 - PCI Ethernet Controller PCI Function 1	 Enabled	
PCI-3 - PCI Ethernet Controller PCI Function 1	 Enabled	
Embedded - PCI PCI Bridge - Bus 2 PCI Function 1	 Enabled	
Embedded - PCI SCSI Controller PCI Function 1 PCI Function 2	 Enabled Enabed	
Embedded - PCI VGA Controller PCI Function 1 Standard VGA Resources	 Enabled Enabled	

ISA Board Configuration

If you want to add a non-Plug and Play ISA board to your system, use the following procedures to define and add the option board. It is necessary to define an ISA board to prevent other boards in the system from using the same IRQ levels, DMA channels, I/O port addresses, or memory addresses, that your ISA board uses.

You must run the RCU and add the ISA board to the configuration before installing the ISA board in the system, otherwise the resources on the ISA board may conflict with a Plug-and-Plug board in the system.

BIOS automatically assigns ISA Plug-and-Plug boards to the next available slot. If the slot displayed in Step 2: "Add or Remove Boards" is not the actual slot, it can be moved by using the F7 function key.

Notice: IRQ levels, DMA channels, I/O port addresses, and memory addresses defined using this procedure should reflect the same settings defined by supplied jumpers and/or configuration documents.

---

1. Insert the RCU diskette into drive A: and power-on the system. The system boots-up using the RCU diskette.

2. The RCU Main Menu shown in Table 4-1 is displayed. At the Startup Menu, enter choice 2, *Configure Computer*.

3. The Resource Configuration Utility Menu shown in Table 4-2 is displayed. Select Step 2 *Add or Remove Boards* and press ENTER.

4. The *Step 2: Add or remove boards* screen is displayed. At this screen select *Add* by pressing INSERT.

5. The *Add* screen is displayed telling you to locate the diskette that contains the .cfg file for the board. Press ENTER at this screen.

6. The *Select a Configuration (CFG) file to add* screen is displayed. At this screen select *Not Listed* by pressing F5.

7. The *Add a board without a .cfg file* screen is displayed. Read through the information and press ENTER. The *Add a board without a .cfg file* screen reappears. When the screen reappears select *Create .cfg file* and press ENTER.

8. The *Create A Board CFG File* screen is displayed. At this screen enter the board description and manufacturer and press ENTER.

9. The *New Board Setup* screen is displayed. Using the scrollable list select the resources used by the new ISA board. Table 4-4 provides a place for you to record the configuration you assign to the board.

10. Press F10 when you are finished selecting the resources used by the new ISA board.

11. The *View Current Settings* screen is displayed. Press ENTER to save the current settings.

12. The *Add confirmation* screen is displayed. Review the manufacturer's comments and press ENTER.

Table 4-4. ISA Board Configurations

ISA BOARD DEFINITIONS	YOUR CONFIGURATION
Board Description:	
Manufacturer:	
Interrupts (Select from scrollable list)	
DMA Channels (Select from scrollable list)	
Port address (Select from scrollable list)	
Start	
End	
Memory address (Select from scrollable list)	
Start	
Length	
Slot (Select from scrollable list)	

13. The *Add* screen is displayed. Select the slot in which you want to install the board and press ENTER.

    Note: If the board you add causes a conflict in the configuration, a Caution message is displayed. Press ENTER at the message. This leads you to the screens that allow you to resolve the conflict.

14. The *Step 2: Add or remove boards* screen is displayed. At this screen select *Done* by pressing F10.

15. The *Steps in configuring your computer* screen is displayed. At this screen select "Step 4: Examine switches or print report" and press ENTER.

16. The *Step 4: Examine switches or print report* screen is displayed. The boards marked with an arrow indicate that the boards in your system may have jumpers and switches that you must physically verify or that a software statement with additional information about the board is provided. Select *Done* by pressing F10.

    Note: If the ISA board you are adding to the configuration does not have switches, jumpers, software statements or connection information, an Information message appears on screen. Press ENTER and proceed to the next step.

17. The *Steps in configuring your computer* screen is displayed. At this screen select "Step 5: Save and exit" and press ENTER.

18. The *Save and exit* screen is displayed. At this screen select "Save the configuration and restart the computer" and press ENTER.

19. The *Reboot* screen is displayed. At this screen press ENTER.

20. Now that you have reserved the system resources, you can install the ISA board.

BIOS Setup Utility

The BIOS Setup Utility, like the RCU, is used to change system configuration parameters. This utility has some unique parameters and many parameters that are also configurable with the RCU. The utility is resident in the system FLASH memory and does not require a diskette or an operating system present to run. However, some parameters set with the BIOS Setup Utility that can also be set with the RCU, will be overwritten by the RCU the next time the RCU is run.

Using the BIOS Setup Utility

You access the BIOS Setup Utility when you turn on or reboot your system. To run the BIOS Setup Utility, perform the following procedure:

1. Power-on or reboot the system. BIOS displays the following:

   Press <F2> to enter SETUP

2. Press **F2**. After BIOS POST completes, the BIOS Setup Utility starts and the Main Menu is displayed. The menu bar at the top of the Main Menu lists the following selections:

Menu	Use
Main	Use this menu for basic system configuration.
Advanced	Use this menu for setting the Advanced Features available on your system.
Security	Use this menu to set User and Supervisor Passwords and the Backup and Virus-Check reminders.
Server	Use this menu for configuring Server Features.
Exit	Exits the current menu.

Use the arrow keys to select a menu or an item on a displayed menu. Press the value keys (listed in the table below) to cycle through the allowable values for the selected field. Use the Exit menu's "Save Values" selection to save the current values on all the menus.

To display a submenu, position the cursor on a selection that has a submenu and press ENTER. Selections with submenus are preceded by an arrow.

Refer to the following table for information on the keys you use with Setup. These keys are also listed at the bottom of the Setup menu.

Key	Function in Setup Menu
F1 or Alt-H	General Help window.
ESC	Exit the current menu.
← or → arrow keys	Select a different menu.
↑ or ↓ arrow keys	Move cursor up and down. The cursor moves only to the settings that you can change.
TAB or SHIFT-TAB	Cycle cursor up and down.
HOME or END	Move cursor to top or bottom of window.
PAGE UP or PAGE DOWN	Move cursor to next or previous page.
F5 or -	Select the previous value for the field.
F6 or + or SPACE	Select the next value for the field.
F9	Load default configuration values for this menu.
F10	Load previous configuration values for this menu.
ENTER	Execute command or Select ➨ submenu.
ALT-R	Refresh the screen.

BIOS Setup Configuration Settings

Table 4-5 shows the normal settings for the BIOS Setup Utility and provides a place for you to record any changes you make to these settings.

Table 4-5. BIOS Setup Configurations

MENU PARAMETER NAME	NORMAL SETTING OR DISPLAY ONLY	YOUR CONFIGURATION
MAIN MENU		
System Time Enter current time (hour, minutes, seconds on 24 hour clock).	Current Time	
System Date Enter current date.	Current Date	
***Diskette A:** Use +/- to change values; indicates the type of diskette drive installed.	1.44MB, 3 1/2”	
***Diskette B:** Use +/- to change values; indicates the type of diskette drive installed (Not Installed in your system).	Not Installed	
Memory Cache Press ENTER for menu.		
Memory Cache	Enabled	
Cache System BIOS Area	Write Protected	
Cache Video BIOS Area	Write Protected	
Cache Base 0 - 512K	Write Back	
Cache Base 512K - 640K	Write Back	
Cache Extended Memory Area	Write Back	
*Cache Memory Regions		
Cache C800-CBFF	Uncached	
Cache CC00-CFFF	Uncached	
Cache D000-D3FF	Uncached	
Cache D400-D7FF	Uncached	
Cache D800-DBFF	Uncached	
Cache DC00-DFFF	Uncached	
Memory Shadow Press ENTER for menu.		
System Shadow	Enabled	
Video Shadow	Enabled	
*Regions with Legacy Expansion ROMs		

* This parameter will be overwritten by the RCU setting.

Table 4-5. BIOS Setup Configurations (Continued)

MENU PARAMETER NAME	NORMAL SETTING OR DISPLAY ONLY	YOUR CONFIGURATION
MAIN MENU		
***Boot Sequence** Press ENTER for menu.		
Boot Sequence	A: then C:	
POST Errors	Enabled	
***Numlock** Press ENTER for menu.		
Numlock	ON	
Key Click	Enabled	
Key Board auto-repeat rate	10/sec	
Key Board auto-repeat delay	1 sec	
Base Memory:	640 KB Display only	
Extended Memory:	127 MB Display only	
ADVANCED MENU		
***Integrated Peripherals** Press ENTER for menu.		
Serial Port 1	3F8, IRQ 4	
Serial Port 2	2F8, IRQ 3	
Parallel Port	378, IRQ 7	
Parallel Mode	Bi-directional	
Diskette Controller	Enabled	
Mouse	Enabled	
Memory Reconfiguration Press ENTER for menu.		
Memory Reconfiguration	Enabled	
DIMM Group #1 Status	Normal	
DIMM Group #2 Status	none	
DIMM Group #3 Status	none	
DIMM Group #4 Status	none	
DIMM Group #5 Status	none	
DIMM Group #6 Status	none	

* This parameter will be overwritten by the RCU setting.

Table 4-5. BIOS Setup Configurations (Continued)

MENU PARAMETER NAME	NORMAL SETTING OR DISPLAY ONLY	YOUR CONFIGURATION
ADVANCED MENU		
DIMM Group #7 Status	none	
DIMM Group #8 Status	none	
Clear DIMM Errors	Press ENTER	
DIMM Error Pause	Enabled	
CPU Reconfiguration Press ENTER for menu.		
CPU Reconfiguration	Enabled	
CPU #11 Status	Normal	
CPU #12 Status	Normal	
CPU #13 Status	Normal	
CPU #21 Status	Normal	
CPU #22 Status	Normal	
CPU #23 Status	Normal	
Clear CPU Errors	Press ENTER	
CPU Error Pause	Enabled	
PCI Devices Press ENTER for menu.		
PCI Parity Error	Enabled	
PCI IRQ1	Auto	
PCI IRQ2	Auto	
PCI IRQ3	Auto	
PCI IRQ4	Auto	
PCI IRQ5	Auto	
PCI IRQ6	Auto	
PCI IRQ7	Auto	
PCI IRQ8	Auto	
PCI IRQ9	Auto	
PCI IRQ10	Auto	
PCI IRQ11	Auto	
PCI IRQ12	Auto	

Table 4-5. BIOS Setup Configurations (Continued)

MENU PARAMETER NAME	NORMAL SETTING OR DISPLAY ONLY	YOUR CONFIGURATION
PCI IRQ13	Auto	
PCI IRQ14	Auto	
PCI IRQ15	Auto	
PCI IRQ16	Auto	
Advanced Press ENTER for menu.		
Plug & Play O/S	No	
Reset Configuration Data	No	
SECURITY MENU		
Supervisor Password is	Disabled	
User Password is	Disabled	
***Set Supervisor Password**	Press ENTER.	
Set User Password	Press ENTER.	
****Password on boot**	Disabled	
****Diskette Write**	Normal	
****Diskette access**	Everyone	
System backup reminder	Disabled	
Virus check reminder	Disabled	
Power Switch Mask	Unmasked	
SCSI Select Utility Mask	Unmasked	
SYSTEM HARDWARE MENU		
Thermal Sensor Press ENTER for menu.		
Thermal Sensor	Enabled	
Upper Limit	65	
Lower Limit	5	
ESM IRQ	IRQ 10	
Console Redirection	Disabled	
SMI	Enabled	
Error Log Initialization	No	

* Enabling supervisor password requires a password for entering SETUP.
** These parameters require prior setting of supervisor password.

Exiting BIOS Setup

To exit Setup, select Exit from the menu bar to display the Exit Setup menu.

The following table describes the options on this menu. Note that ESC does not exit this menu. You must select one of the items from the menu or menu bar to exit this menu.

SELECTION	DESCRIPTION
Save changes and Exit	Stores the selections displayed in the menus in CMOS and exits the Setup program.
Exit without Saving Changes	Exits the program without saving any changes you have made in this session. Previous selections remain in effect.
Get Default Values	Displays default values for all Setup menus. Useful if BIOS detects a problem with the values stored in CMOS.
Load Previous Values	Reverts to previously saved values if the new values have not been saved to CMOS.
Save Changes	Stores the current selections without exiting the Setup program.

SCSISelect Utility

The system I/O board includes an integrated AIC7895 dual SCSI host controller used to manage SCSI devices in your system. When used, Channel A of this controller provides support for four internally mounted ultra/wide hard disk drives. Channel B provides support for internally mounted tape and CD-ROM devices as well as externally connected SCSI devices.

The integrated SCSI host controller is configured using the SCSISelect utility. Use the SCSISelec*t* utility to:

- Change the SCSI host adapters default values.
- Check and/or change SCSI device settings for a particular device.
- Perform low-level formatting on SCSI disk devices.
- Perform verify operations on SCSI disk devices.

When disabling access to the SCSISelect Utility, the SCSISelect utility should be used in conjunction with the BIOS Setup Utility. Changing the BIOS Setup Utility "SCSI Select Utility Mask" parameter to Masked prevents the use of the SCSI Select utility via Ctrl-A, but the "Press <Ctrl-A> for SCSI Select" prompt is still displayed. Changing the SCSISelect utility "Display <Ctrl-A> Message During BIOS Initialization" parameter to Disabled prevents the prompt from being displayed. In combination these parameters can be used to prevent access to the SCSISelect utility during boot.

Using the SCSISelect Utility

To run the SCSISelect Utility, perform the following procedure:

1. Power-on the system. The system boots up.
2. During initialization, press CONTROL + A. The SCSISelect Utility starts. When SCSISelect detects the AIC-7895 host adaptor, it displays a selection menu listing the bus and device number of each channel. When the selection menu appears, select the channel you wish to configure as follows:

Bus : Device : Channel	Selected SCSI Channel
00 : 01 : A	A
00 : 01 : B	B

3. Once you select the channel, the following screen is displayed:

SCREEN	DESCRIPTION
Configure/View Host Adapter Settings	Configure host adapter and device settings.
SCSI Disk Utilities	The utility scans the SCSI bus for SCSI devices, reports a description of each device. Run these utilities *before* configuring SCSI devices.

4. If you wish to format a disk, verify disk media, or display a list of devices and their SCSI Ids, select “SCSI Disk Utilities”. If you wish to configure the adapter or a device, select “Configure/View Host Adapter Settings”.

SCSISelect Configuration Settings

The following keys are active for all SCSISelect screens:

KEY	ACTION
Arrows	Up and down arrows move from one parameter to another within a screen.
ENTER	Displays options for a configurable parameter. Selects an option.
ESC	Moves back to previous screen or parameter or EXIT if at the Main menu.
F5	Switches between color and monochrome.
F6	Resets to host adapter defaults.

Table 4-6 shows the normal settings for the SCSISelect Utility and provides a place for you to record any changes you make to these settings.

Exiting SCSISelect

To exit SCSISelect, press ESC until a message prompts you to exit (if you changed any settings, you are prompted to save the changes before you exit).

Table 4-6. SCSISelect Setup Configurations

OPTION	RECOMMENDED SETTING OR DISPLAY ONLY	YOUR CONFIGURATION
SCSI Bus Interface Definitions		
Host Adapter SCSI ID	7	
SCSI Parity Checking	Enabled	
Host Adapter SCSI Termination	Enabled	
Additional Options		
Boot Device Options	Press ENTER for menu	
Boot Channel	A First	
Boot SCSI ID	0 [7]	
Boot LUN Number	0	
SCSI Device Configuration	Press ENTER for menu	
Initiate Sync Negotiation	Yes	
Maximum Sync Transfer Rate	40.0 [4]	
Enable Disconnection	Yes	
Initiate Wide Negotiation	Yes [5]	
Send Start Unit Command	Yes [1 and 5]	
BIOS Multiple LUN Support	no [1]	
Include in BIOS Scan	Yes [1]	
Advanced Configuration Options	Press ENTER for menu.	
Reset SCSI Bus at IC Initialization	Enabled	
Extended BIOS Translation for DOS Drives >1 GByte	Enabled	
Host Adapter BIOS (Configuration Utility Reserves BIOS Space)	Enabled.[1]	
Support Removable Disks Under BIOS as Fixed Disks [1, 2]	Boot Only[1]	
Display <Ctrl-A> Messages During BIOS Initialization	Enabled[1]	
BIOS Support for Bootable CD-ROM	Disabled[1 6]	
BIOS Support for INT 13 Extensions	Enabled[1]	

[1] No effect if BIOS is disabled.
[2] Do not remove media from a removable media drive if it is under BIOS control.
[3] Set to Disable if NetWare 3.12 or 4.11 Network Operating System is installed.
[4] Set to 40.0 for channel A or 10.0 for channel B.
[5] Set to Yes for channel A or No for channel B.
[6] Set to Enabled for channel B or Disabled for channel A.
[7] Set to 0 for channel A or 5 for channel B.

Using the Utilities Diskette to View the Event Log

The utilities diskette contains the Event Log Reader Utility. The system Event Log Utility displays information on the events stored in the system log area. The information stored includes the name of the event, the date and time the event occurred and data pertinent to the event. Event data may include POST error codes that reflect hardware errors or software conflicts within the system.

Note: Refer to Chapter 5 *Problem Solving* for definitions on all POST error codes.

To view the Event Log, perform the following procedure:

1. Using the EXPRESSBUILDER CD-ROM, create the Utilities diskette.
2. Insert the bootable Utilities diskette into floppy disk drive A.
3. Power-on the system. The system boots up.
4. The System Event Log Utility starts. The System Event Log Utility screen is displayed. The screen choices in Table 4-7 are available.

Table 4-7. System Event Log Utility

SCREEN	DESCRIPTION
File	Saves the Event Log and System information to a file.
ElogInfo	Displays Event Log information such as: date, time, and number of times the log was erased; major and minor revision level; and amount of memory used by the event log.
SystemInfo	Displays system information such as: system model; processor type and speed; ROM, SCSI and video BIOS version; number of ISA and PCI slots; total system memory size; and serial and parallel port configuration.
Event log	Displays the Event Log data.
Clear Event log	Not available. Use BIOS Setup to clear the log.
Help	Description of information in this table.
Exit	Exits the System Event Log Utility.

To select an option from the System Event Log Utility screen, use ← and → to highlight the item and press ENTER.

To exit the menu item, press ESC.

Configuring the Optional RAID Controller

One of the options available for the HX4100 system is the three channel DAC960 Redundant Array of Inexpensive Devices (RAID) Controller board, which gives your system the added security of fault tolerance. The RAID controller is included on the HX6100 system.

If you order a system with the RAID controller, the system is pre-configured at the factory. Use Table 4-8 to determine how the RAID controller was configured at the factory. If you want to change the RAID level or add additional hard disks to the array, you must use the DACCF utility.

Table 4-8. RAID Configurations

Number of Hard Drives	RAID Level Configured	Hard Drives in Array	Description
1	JBOD	1	**JBOD (Mylex RAID 7)** JBOD is an acronym for Just a Bunch Of Disks. Each drive can operate independently as with a common host bus adapter; or multiple drives may be spanned and seen as a single very large drive. No redundancy is provided.
2	1	2	**Mirroring (RAID 1)** Drives are paired and mirrored. All data is 100% duplicated on an equivalent drive (fully redundant).
3	5	3	**Striping with Parity (RAID 5)** Data is striped across several physical drives. Parity protection is used for data redundancy.
4 or more	5	4 (one standby drive)	**Striping with Parity (RAID 5) with a standby drive** The array consists of three ON-LINE drives and one STANDBY drive. The standby replacement drive, or hot spare, is one of the most important features RAID provides to achieve automatic, non-stop service with a high degree of fault-tolerance.

If you are adding the RAID controller to an existing system, the DACCF utility allows you to configure your disk array before installing your network operating system.

The DACCF utility is included with the RAID controller. The DAC960 RAID controller supports various versions of RAID technology (referred to as RAID levels). To use any RAID level, you must configure the RAID controller using the DACCF configuration utility prior to installing your Network Operating System. For an explanation of this utility, refer to the *DACCF Utilities Installation Guide and User Manual* that was shipped with the controller. Chapter 2 of the manual (*Configuration Strategies)* describes RAID technology and provides tips on making your array perform well in your specific application. Chapter 3 (*Preparing the Array)* covers array hardware preparation, configuration, and initialization. After completing the steps in chapter 3, you can install your Network Operating System.

If you want to be able to remotely (from a PC client) configure the array; increase array capacity online; or monitor statistics on disk and controller activity, you must install the Global Array Manager (GAM) option that was provided with your RAID subsystem. The GAM option includes diskettes and user documentation. Use of GAM is documented in the *Global Array Manager 2 Server Installation Guide*. Increasing array capacity is covered in the *MORE User Guide*. This user guide covers enhancements to both the Global Array manager and DACCF utilities software that implement online RAID expansion (MORE) technology.

Configuring System Jumpers and Switches

This section describes the jumpers and switches used on the I/O riser board, CPU base board, and system I/O board.

Before You Begin

Only a qualified technical person should perform the procedures in this section.

Notice: Electrostatic discharge (ESD) can damage the system boards. Modify the boards only at an ESD workstation. Otherwise, wear an antistatic wrist strap attached to chassis ground.

The system jumpers enable you to set specific operating parameters for your system. A jumper is a small plastic-encased conductor (shorting plug) that slips over two jumper pins.

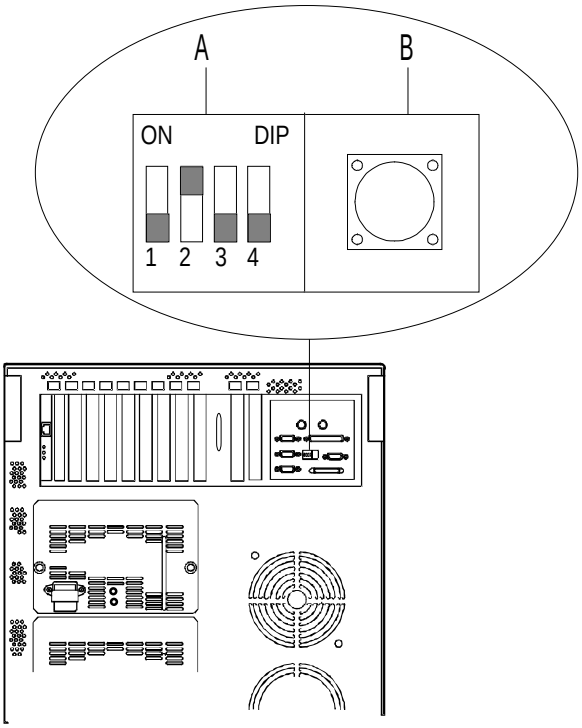
Configuring I/O Riser Board Function Select Switches

This section describes how to configure and set the I/O riser board function select switches for specific operating parameters. The function select DIP switches configure the use of the front panel reset switch and the use of an optional uninterruptible power supply (UPS) unit.

Caution: Before doing the procedures in this section, make sure that your system is powered off and unplug the AC power cord from the back of the chassis. Failure to disconnect power before setting switches and moving jumpers can result in personal injury and equipment damage

Figure 4-1 shows the DIP switches that consist of a block of four switches, accessible on the I/O panel that is located on the I/O riser board at the rear of the chassis.

Figure 4-1. Function Select Switches



Function Select Switches and Dump Button

A Function select switches

B Reserved

Note: The switches are set correctly at the factory for your system configuration. If your system requires a switch change, change only the switch setting for that condition. Otherwise keep the switches at their factory settings.

Table 4-9 shows the switch configurations and functions. Set the switches per Table 4-9 and the following steps.

To change a switch setting, use the following procedure.

Note: Power must be completely off before setting the switches, otherwise the settings will not be recognized.

1. At the front of the server, press the Power switch off.

2. At the rear of the server, locate the Function Select DIP switch (see Figure 4-1) that you want to change.

3. Set the appropriate switch on or off, according to Table 4-9.

   Note: If you set SW3 to On for use with an optional UPS unit, power the unit up before switching power on the server.

4. Press the main Power switch on.

   - If using an UPS unit, the server powers up as soon as the UPS unit is turned on.
   - If not using the UPS unit, press the Power button on the front of the server.

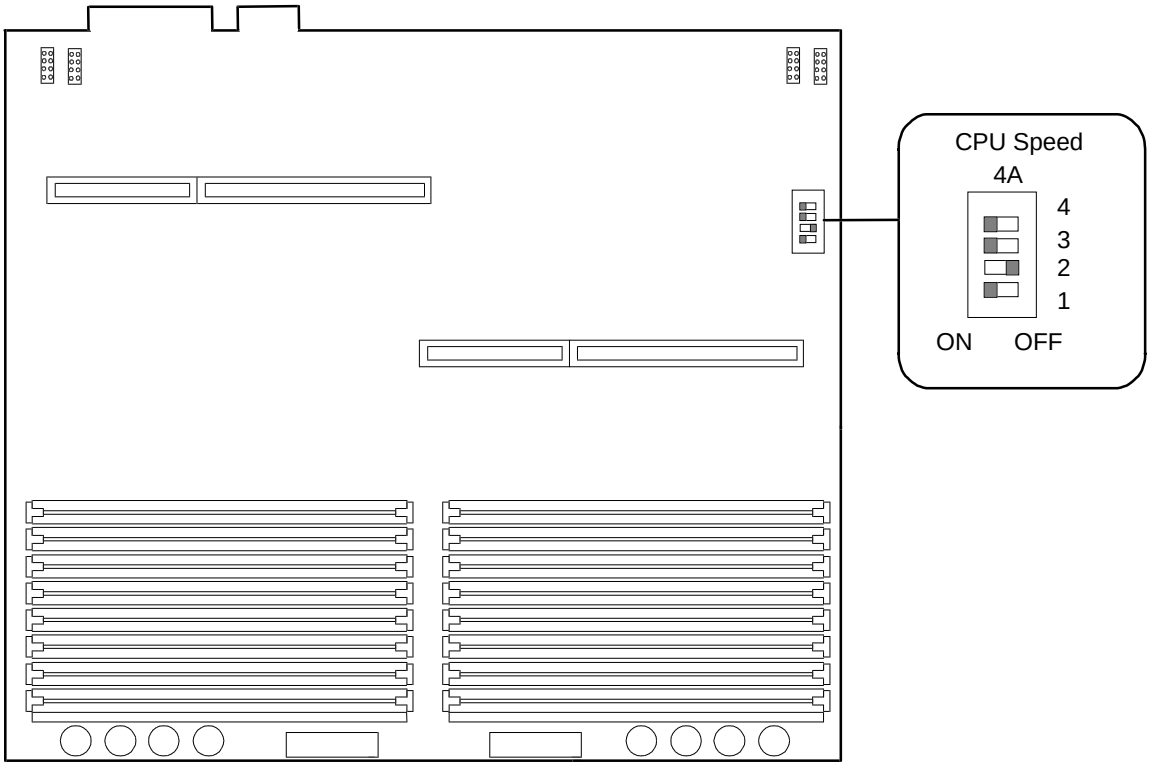
Table 4-9. Function Select Switch Settings

Switch	Description	Settings	Function
SW1	Reserved for future use.	Off (factory setting) On	
SW2	Reset pushbutton control	Off On (factory setting)	Front panel Reset pushbutton switch is disabled. Front panel Reset pushbutton switch is enabled.
SW3	AC power source control	Off (factory setting) On	DC power can only be turned on from the front panel switch. If AC goes off and then back on, system will not power on until front panel switch is used. DC power will turn on when AC power comes on. Use this setting with an optional uninterruptible power supply (UPS) that auto-cycles AC power or if no UPS and auto-power on after power lose is desired.
SW4	Reserved for future use.	Off (factory setting) On	

Configuring CPU Base Board Function Select Switches

This section describes how to configure the CPU base board function switch for the speed of the CPUs. Figure 4-2 shows the location and settings of the CPU base board switches.

Figure 4-2. CPU Base Board Jumper



Configuring System I/O Board Switches and Jumpers

The system I/O board switches and jumpers enable you to set specific operating parameters for your system. Figure 4-3 shows the location of the switches and jumpers. Table 4-10 lists the system I/O board switches and jumpers and their factory default settings.

Figure 4-3. System I/O Board Switches and Jumpers

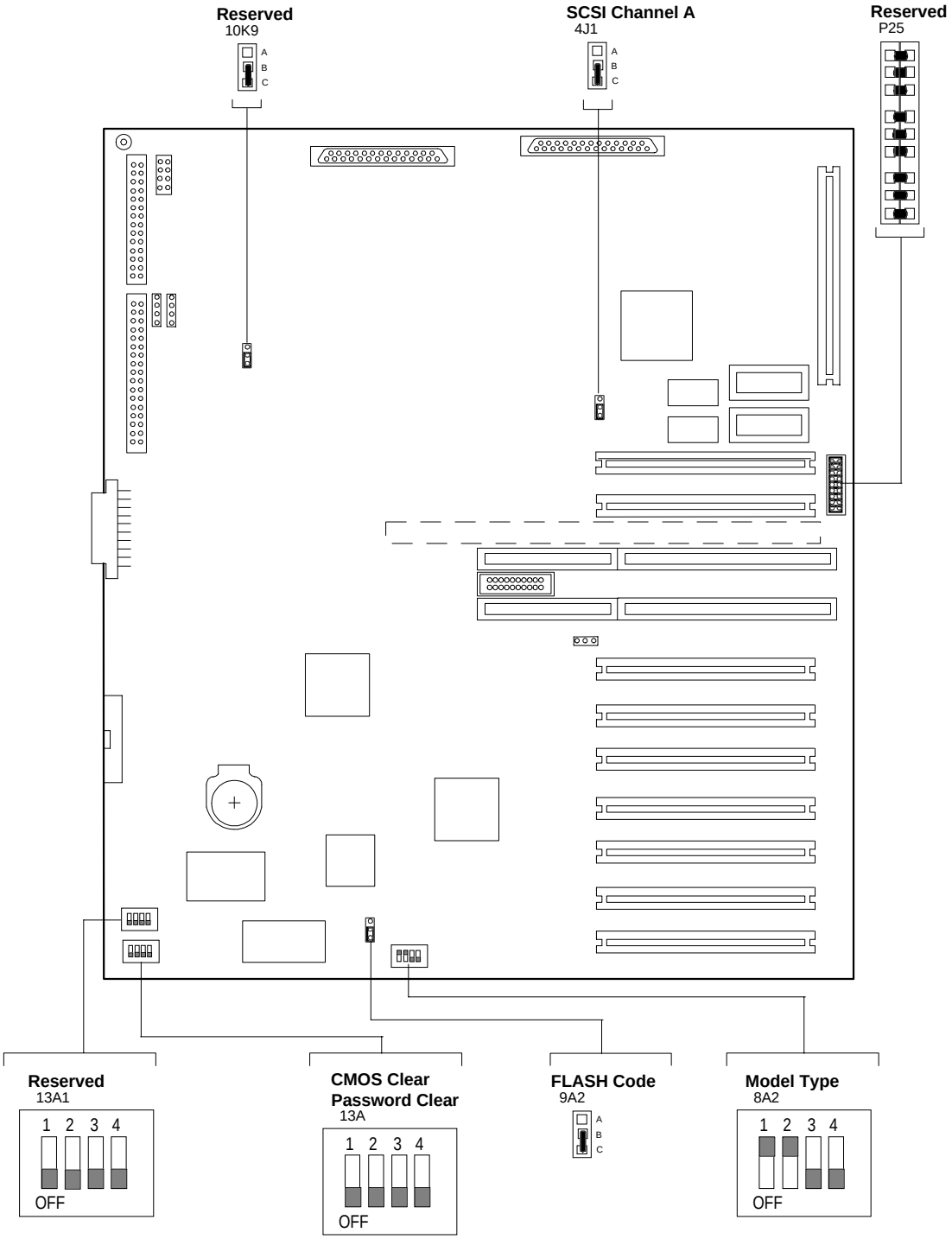


Table 4-10. System I/O Board Switch and Jumper Configurations

Switch/ Jumper	Description	Option	Setting	Factory Default	Your Setting
SCSI Channel A **4J1**	SCSI channel A select	Narrow SCSI for channel A Wide SCSI for channel A	A-B B-C	B-C (down)	
FLASH Code **9A2**	FLASH reprogramming protection	BIOS write protected; no update BIOS not write protected; update	A-B B-C	B-C (down)	
Reserved **P18**	All nine jumpers must be in.	Required on factory default.	IN	IN	IN
Reserved **10K9**		Required on factory default.	B-C	B-C (down)	B-C (down)
Reserved **13A1 SW1**		Required on factory default.	OFF	OFF	OFF
Reserved **13A1 SW2**		Required on factory default.	OFF	OFF	OFF
Reserved **13A1 SW3**		Required on factory default.	OFF	OFF	OFF
Reserved **13A1 SW4**		Required on factory default.	OFF	OFF	OFF
CMOS Clear **13A SW1**	Real-time clock CMOS protection	RTC CMOS clear RTC CMOS not cleared	ON OFF	OFF	
Password Clear **13A SW2**	Password protection	Password clear Password protected	ON OFF	OFF	
Reserved **13A SW3**		Required on factory default.	OFF	OFF	OFF
Reserved **13A SW4**		Required on factory default.	OFF	OFF	OFF
Model Type **8A2 SW1**	Used with switches 8A2 SW2, 8A2 SW3 and 8A2 SW4 to set server model	Required on factory default.	ON	ON	ON
Model Type **8A2 SW2**	Used with switches 8A2 SW1, 8A2 SW3 and 8A2 SW4 to set server model	Required on factory default.	ON	ON	ON
Model Type **8A2 SW3**	Used with switches 8A2 SW1, 8A2 SW2 and 8A2 SW4 to set server model	Required on factory default.	OFF	OFF	OFF
Model Type **8A2 SW4**	Used with switches 8A2 SW1, 8A2 SW2 and 8A2 SW3 to set server model	Required on factory default.	OFF	OFF	OFF

Setting Switches and Jumpers

Caution: Before doing the procedures in this section, make sure that your system is powered off and unplug the AC power cord from the back of the chassis. Failure to disconnect power before moving the jumpers can result in personal injury and equipment damage

Notice: Observe static precautions. Use an antistatic wrist strap.

To change the setting of any of the configuration switches or jumpers on any of the system boards:

1. Power off the system and remove the covers as described in Chapter 5 of this guide.
2. Check to ensure the system power cord is removed from the back of the system.
3. Locate the switch or jumper you are changin. Refer to Figure 4-3.
4. To change a switch setting, use a pen or your finger to move the switch to the desired setting. To change a jumper setting, use a pair of needle-nose pliers or your fingers to remove the jumper from its current location. Position the jumper over the two pins for the desired setting and press it onto the pins. Be careful not to bend the pins. Refer to Table 4-10 for board switch or jumper settings.
5. Record changes to the board settings in Table 4-10.
6. Install the system covers and power up the system using procedures in chapter 5 of this guide.
7. Run the Setup Utility to verify your reconfiguration of the board.

BIOS

This subsection contains procedures for updating your BIOS and changing the language used by the BIOS Setup Utility.

Updating the BIOS

You should use this procedure when you receive a BIOS FLASH diskette from your service representative. To update the system BIOS:

Note: This procedure clears the event log contents. If you want to save the event log contents, run the Event Log Reader Utility.

1. Insert a bootable DOS diskette into Drive A and power up the system.
2. Remove the MS-DOS diskette and insert the BIOS FLASH diskette into Drive A.
3. Enter PHLASH and press ENTER.
4. After the system reboots, load the default values by pressing F2 to enter setup. At the Exit Menu, select *GET* DEFAULT *VALUES*.
5. Clear the event log by selecting *CLEAR EVENT LOG* at the Server Menu. Press space bar to change NO to YES and press ESC. Select *SAVE CHANGES & EXIT* and press ENTER to continue. The system will reboot.

If the procedure fails, perform the following steps and then retry the Update BIOS procedure.

1. Turn off the system and remove the panels as described in the *Upgrades and Options* chapter.
2. Ensure the FLASH Code jumper 9A2 is set to pins B-C to enable updates to the BIOS (see Figure 4-3).
3. Replace the panel and power up the system with the BIOS FLASH diskette inserted in Drive A.

Changing the BIOS Setup Language

The BIOS Setup Utility used by your server supports two languages: English and one other. As shipped from the factory, the BIOS Setup Utility supports English and French. If you want to use either German, Spanish, or Italian as the second language, you must use the Multi-Language BIOS FLASH Diskettes to change the supported languages. The diskettes are:

- Multi-Language BIOS FLASH Diskette 1 of 2. This diskette contains the English/French and English/German language files along with the PhoenixPhlash Utility.
- Multi-Language BIOS FLASH Diskette 2 of 2. This diskette contains the English/Spanish and English/Italian language files along with the Crisis Recovery Utility.

Language Change Instructions

Follow these steps to change the BIOS Setup language.

1. Using the EXPRESSBUILDER CD-ROM, create the Multi-Language BIOS FLASH Diskettes.
2. Insert Multi-Language BIOS FLASH diskette 1 of 2 into floppy disk drive A and power up the system.
3. The BIOS Flash Diskette Language Selector menu displays. The selections are:

    1. English/German
    2. English/French
    3. English/Spanish
    4. English/Italian.

4. Enter the number corresponding with your language choice and press ENTER. If you choose either English/ Spanish or English/Italian, you will be asked to load diskette 2 of 2. If so, insert Multi-Language BIOS FLASH diskette 2 of 2 into floppy disk drive A.

5. An acknowledgment message displays:

   You are about to Flash your system in English/xxx

   Is this correct

   Using the arrow keys, highlight YES and press ENTER.

6. The PhoenixPhlash Status message displays. This screen displays the progress of the PhoenixPhlash Utility. During the loading of the BIOS, the system sounds a series of short beeps. When the utility is complete, it displays a complete message along with the following:

   PRESS ANY KEY TO RESTART THE SYSTEM

7. Remove the Multi-Language BIOS FLASH diskette from floppy disk drive A.

8. Press any key and the system restarts. You can verify the language change by pressing the F2 key to enter the BIOS Setup Utility.

BIOS Recovery Instructions

If the BIOS language update procedure fails leaving your BIOS in an unusable and unrecoverable state, perform the following steps and then retry the BIOS language update.

Because of the small amount of code available in the non-erasable boot block area, video is not available to direct the recovery procedure. The procedure can be monitored by listening to the speaker and looking at the diskette drive LED. When the system gives a continuous series of short beeps and the diskette drive LED is lit, the system is copying the recovery code into the FLASH. As soon as the system gives a long beep, the recovery is complete (takes approximately 75 seconds).

1. If the BIOS language update procedure fails while using Multi-Language BIOS FLASH diskette 1 of 2, insert Multi-Language BIOS FLASH diskette 2 of 2 into floppy disk drive A. Otherwise, keep diskette 2 of 2 in floppy disk drive A.

2. Power off the system and turn the power back on.
3. When the system beeps and the diskette drive LED is lit, the system is copying the recovery code into the FLASH. As soon as the system emits a long beep, the recovery is complete.
4. Power off the system.
5. Remove the Multi-Language BIOS FLASH diskette 2 of 2 from floppy disk drive A. Proceed to the previous procedure to change the BIOS Setup language.

Resetting the CMOS NVRAM

To reset the CMOS NVRAM:

1. Power off the system and remove the panels as described in chapter 5 of this guide.
2. Move the CMOS Clear switch 13A SW1 to OFF (see Figure 4-3).
3. Turn the system on and wait for the POST to complete. This will automatically reprogram the CMOS NVRAM to the default settings.
4. Power off the system.
5. Move the CMOS Clear switch back to ON.
6. Replace the panels and power on the system.
7. Run the Setup Utility to configure your system.

Clearing and Changing the Password

To clear and change the password:

1. Power off the system and remove the panels as described in the Upgrades and Options chapter.
2. Move the Password Clear switch 13A SW2 to ON (see Figure 4-3).
3. Power on the system and wait for POST to complete. This automatically clears the old password.
4. Power off the system.
5. Move the Password Clear switch back to OFF.
6. Replace the panels and power on the system.
7. To specify a new password run the Setup Utility as described earlier in this chapter.

Chapter 5

Upgrades and Options

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Precautions

The following warnings and cautions apply throughout this chapter. Only a technically qualified person should integrate and configure the system.

The only procedure that can safely be done with the system power on is installing (or hot-swapping) an SCA drive/carrier assembly in one of the SCSI hot-swap drive cages or hot-swapping a failed power supply. For any other procedures inside the system, turn off system power and disconnect the AC power cord(s).

Warning: Before doing the procedures in this chapter, make sure that your system is powered off and unplug the AC power cords. Failure to disconnect power before opening your system can result in personal injury and equipment damage

Warning: System power on/off. The DC push-button on/off switch (a convex button) on the front panel DOES NOT turn off the system AC power. To remove power from system, you must unplug the AC power cord(s) (from wall outlet or power supply).

Warning: Hazardous conditions, power supply. Hazardous voltage, current, and energy levels are present inside the power supply. There are no user serviceable parts inside it; servicing should be done by technically qualified personnel

Warning: Hazardous conditions, devices & cables. Hazardous electrical conditions may be present on power, telephone, and communication cables. Turn off the system and disconnect the power cords, telecommunications systems, networks, and modems attached to the system before opening it. Otherwise, personal injury or equipment damage can result

Caution: Electrostatic discharge (ESD) and ESD protection. ESD can damage disk drives, boards, and other parts. This system can withstand normal levels of environmental ESD while you are hot-swapping SCSI hard drives or hot-swapping a failed fan module or power supply. However, we recommend that you do all procedures in this chapter only at an ESD workstation. If one is not available, provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground—any unpainted metal surface—on your system when handling parts

Caution: ESD and handling boards. Always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges. After removing a board from its protective wrapper or from the system, place it component-side up on a grounded, static-free surface. Use a conductive foam pad if available but not the board wrapper. Do not slide board over any surface

Caution: Ensure complete board insertion. When installing a CPU board, confirm visually that the board edge connectors are correctly oriented at the CPU base board connector—not too low or too high. Make sure the CPU board is completely seated in the CPU base board connector before applying power. Incomplete insertion can result in damage. Also ensure that add-in boards are completely and correctly seated in the system I/O board connectors before applying power

Caution: Chassis covers, proper cooling and airflow. For proper cooling and airflow, always install the chassis side and top covers before turning on the system. Operating it without these covers in place can damage system parts

Contact your sales representative or dealer for a list of approved optional peripheral devices.

Preparing Your System for Upgrade

Have the following tools available:

- Phillips screwdriver (#1 bit and #2 bit)
- Flat-head screwdriver
- Small needle nose pliers
- Pen or pencil
- Utility knife
- ESD workstation or antistatic wrist strap (recommended)
- IC removal tool.

Equipment Log

Use the equipment log form located at the end of this manual to record the model and serial number of your system, all installed options, and any other pertinent information specific to your system. You will need this information when configuring your system.

Removing the Front Doors

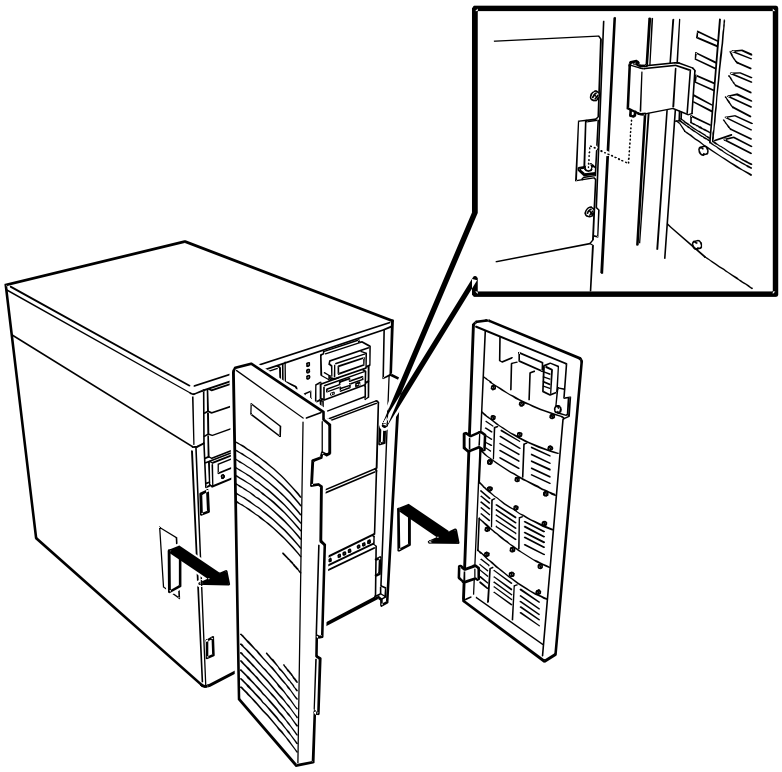
You must remove the front doors to remove the side panels on your system. To remove the front doors:

1. Open the front doors and power off the system. Ensure the power cords are disconnected from their ac wall outlet.

2. Lift one of the front doors and pull it towards you (Figure 5-1). The mounting pins of the front door are disengaged from their mounting holes on the front of the system.

3. Remove the other front door in the same manner.

Figure 5-1. System Front Doors



Installing the Front Doors

1. Orient one of the front doors so the mounting pins of the front door are aligned with their mounting holes on the front of the system. Slide the lower mounting pin into its mounting hole and then slide in the upper pin.

2. Install the other front door in the same manner.

Removing the Top Cover and Side Panels

To install options in your system, you should do the following:

- to modify the system I/O board, add an option board, or add a removable media device, remove the top cover
- to add memory or a processor, remove the left side panel
- to install a hard disk cage, remove the top cover and right side panel.

Caution: For proper cooling and airflow, do not operate the system with the top cover or side panels removed. Always replace them before powering on the system

Caution: Do not damage or bend the EMI fingers that are located along the edges of the top cover and side panels, as you remove and install them, or your system may not meet EMI requirements

Warning: If you are removing the top cover or side panels after the system is set up, you must first power off the system and all external devices. **Unplug** the system power cords

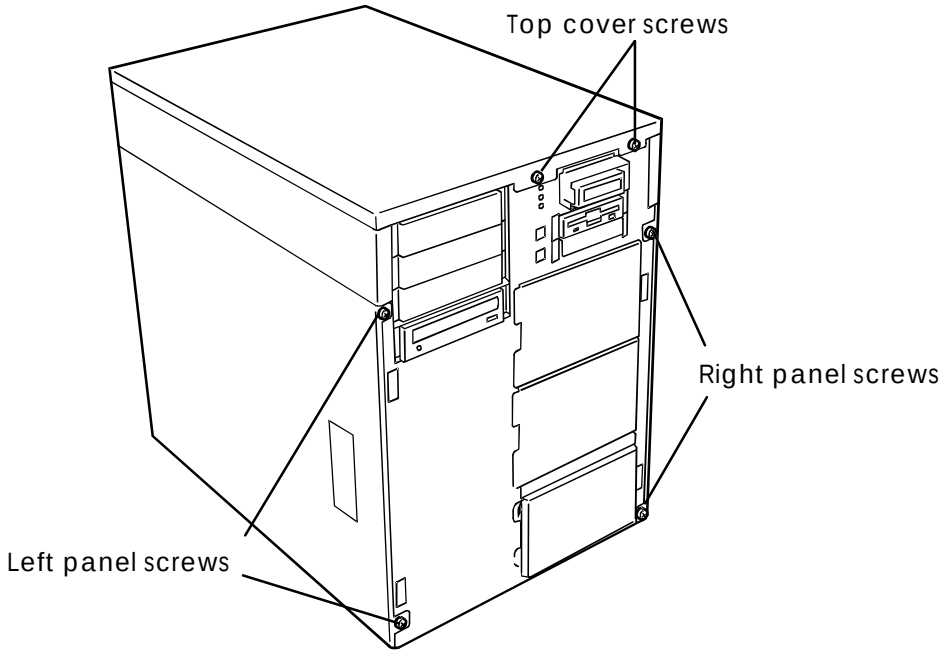
To remove either the top cover or a side panel:

1. Power off the system and ensure the power cords are disconnected from their ac wall outlet.

2. Observe the safety and ESD precautions listed at the beginning of this chapter.

3. The top cover and side panels are secured from the front edge with two thumb lock screws. Loosen the thumb screws (Figure 5-2).

Figure 5-2. Mounting Screws for Top Cover and Side Panels

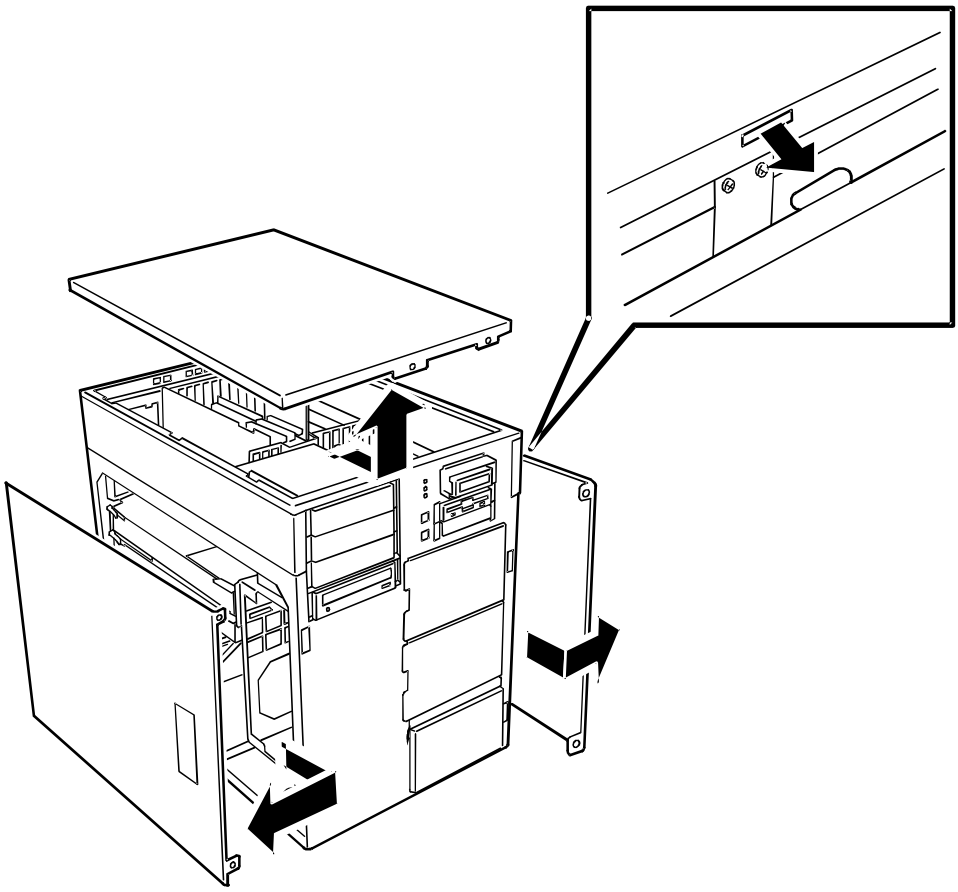


4. Slide the top cover or side panel toward the front of the chassis (Figure 5-3) about an inch until it stops.

5. Pull the top cover or side panel out and away from the chassis.

6. Set the cover or panel aside for reattaching later.

Figure 5-3. Top Cover and Side Panels Removal



Installing the Top Cover and Side Panels

1. Before replacing the top cover or side panel, make sure no tools or loose parts have been left inside the system chassis.

2. Make sure all option boards are firmly seated in their respective slots and that all interior cables are properly connected.

3. The top cover and side panels have tabs that align with the slots in the chassis(Figure 5-3). Align the tabs with the slots in the chassis and carefully push inward.

4. Slide the cover or panel toward the rear of the chassis so the tabs firmly engage in the slots.

5. Attach the cover or panel to the chassis by firmly tightening the two thumb screws.

Note: If your system is already set up, plug the system back in, reconnect the peripherals, and power on the peripherals and system.

Modifying the System I/O Board

The following sections provide procedures for upgrading and configuring the system I/O board in your system. Topics covered include:

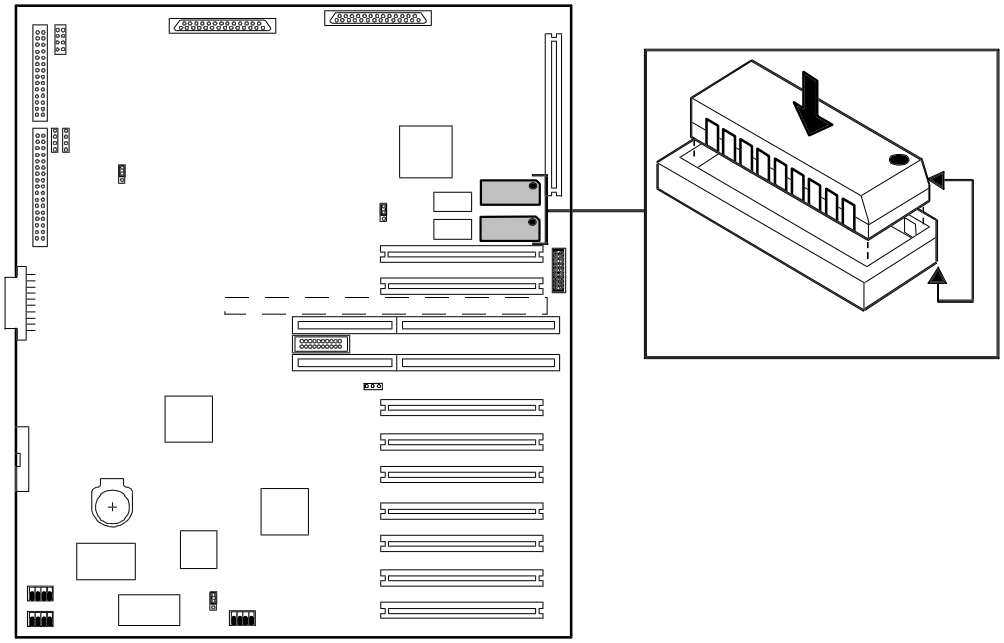
- Installing video memory
- Replacing the non-volatile memory
- Replacing the real-time clock battery.

Notice: Electrostatic discharge (ESD) can damage add-in boards and other components; place them on an antistatic surface. Wear an antistatic wrist strap attached to chassis ground.

Installing Video Memory

The base system includes two 512K video memory modules and two sockets on the system I/O board. If you add two additional 512K video memory modules into the sockets shown in Figure 5-4, the base video memory size is increased from 1 MB to 2 MB.

Figure 5-4. Video Memory Location



To install video memory:

Notice: Observe static precautions. Use an antistatic wrist strap.

1. If the system is on, power off the system and remove the top cover as described earlier in this chapter.

2. Align the beveled edge of the video memory module with the notched corner of the video memory socket. Refer to Figure 5-4 for the video memory socket location.

4. Press the video memory module down firmly until it is fully seated in its socket.

5. Replace the top cover and power on the system.

Replacing the Non-Volatile Memory

You may need to replace the non-volatile memory because of its internal integral lithium battery life span. Contact your sales representative or dealer for a list of approved devices. Its located on your system I/O board as shown in Figure 5-5. Notice the dot on the chip. This dot will assist you in correctly positioning the chip on the system board.

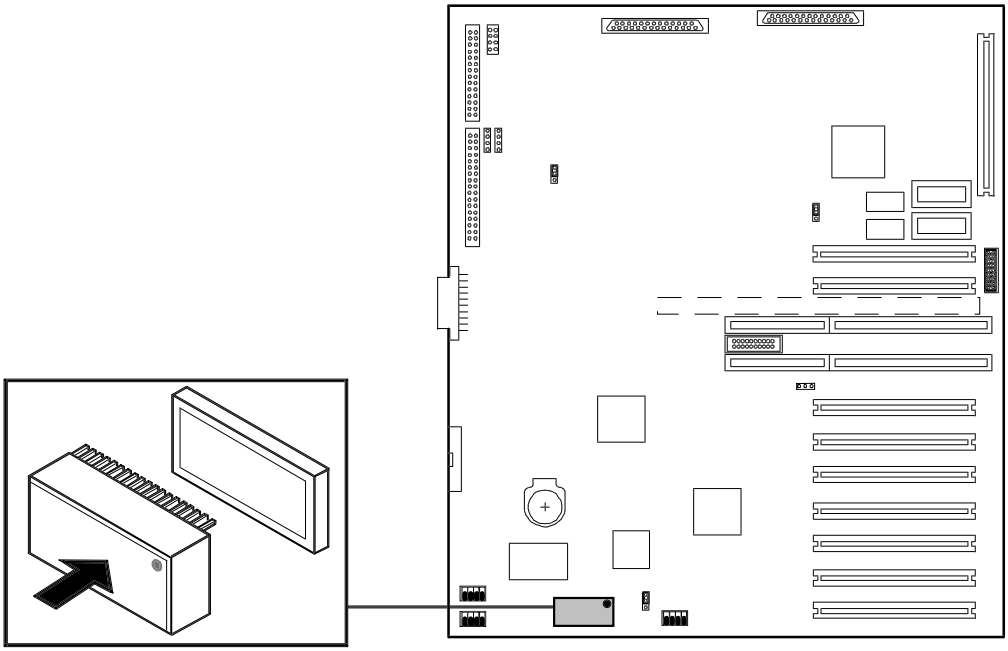
Caution: Danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type recommended by manufacturer. Dispose of lithium batteries as required by local ordinance or as normal waste if no local ordinance exists. Do not expose the component to excessive heat or fire. Keep all batteries away from children

To replace the non-volatile memory:

Notice: Observe static precautions. Use an antistatic wrist strap.

1. Power off the system and remove the top cover as described earlier in this chapter.
2. If the non-volatile memory is secured by a tie-wrap, remove the tie-wrap. Using a IC removal tool or a small pointed tool, gently pry up each end of the non-volatile memory and pull it straight up out of its socket (Figure 5-5).
3. Orient the new chip over its socket so the dot is properly oriented. Carefully insert the chip into its socket connectors.
4. Press down on the chip until it is firmly seated in its socket.
5. Replace the side panel and turn on the system.
6. Run the BIOS SETUP to restore proper configuration settings.

Figure 5-5. Non-Volatile Memory Location

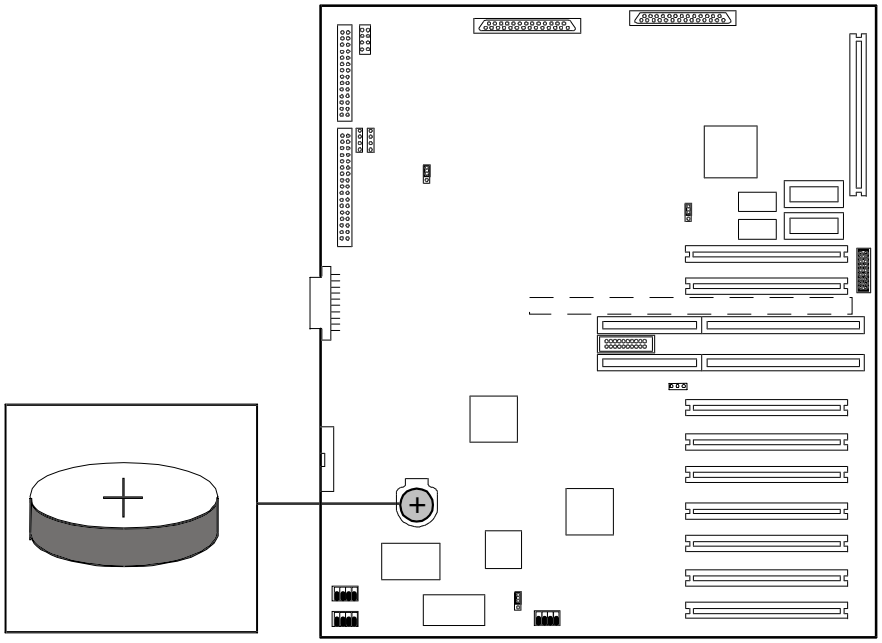


Replacing the Real-time Clock Battery

You may need to replace the real-time clock (RTC) battery because of its battery life span. The battery powers the clock in the absence of power. When the battery starts to weaken, it loses voltage, and the system settings stored in CMOS RAM (for example, the date and time) may be wrong.

The battery (Vendor Part No. CR2450) is a commodity part available through many vendors. Its located on your system I/O board as shown in Figure 5-6. Notice the plus (+) sign on the battery. This sign will assist you in correctly positioning the battery on the system board. Contact your sales representative or dealer for a list of approved devices.

Figure 5-6. Location of the Real-Time Clock Battery



Caution: Danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type recommended by manufacturer. Dispose of lithium batteries as required by local ordinance or as normal waste if no local ordinance exists. Do not expose the component to excessive heat or fire. Keep all batteries away from children

To replace the battery:

Notice: Observe static precautions. Use an antistatic wrist strap.

1. Power off the system and remove the top cover as described earlier in this chapter.

2. If the battery has a protective plastic cover, remove the cover by lifting it away from the battery. Using your finger nail or a small pointed tool, gently push up the bottom edge of the battery and pry the it out of its socket. Refer to Figure 5-6 for the socket location.

3. Orient the new battery over its socket so the plus (+) sign on the battery is facing up.

4. Carefully insert the top of the battery into the socket connectors and gently push the battery into the socket.

5. Press down on the battery until it is firmly seated in its socket.

6. Replace the top cover and turn on the system.

7. Run the BIOS Setup to restore configuration settings to the real-time-clock.

DIMMs

The CPU base board (Figure 2-5) contains sixteen DIMM sockets arranged in eight banks. Each 168-pin socket can hold a single 72-bit DIMM module with 64MB, 128MB, or 256MB of memory. When all sixteen sockets are populated, the memory board supports a maximum of 4GB of memory with 256MB DIMMs. DIMMs must be identical within a bank.

The first bank of DIMMs should be installed in sockets P06 and P08 (Figure 5-7). When you install additional DIMMs, you must start with bank 2 and continue to bank 8. When you remove DIMMs, you must start with the highest populated bank of DIMMs.

The following sections provide procedures for configuring the memory in your system.

Warning: If the system has been running, the CPU boards will be hot. To avoid the possibility of a burn while configuring memory, let the components cool for 10 minutes before continuing with the procedures described here

Installing DIMMs

When properly installed, the DIMM module is oriented at an angle of 90 degrees relative to the CPU base board.

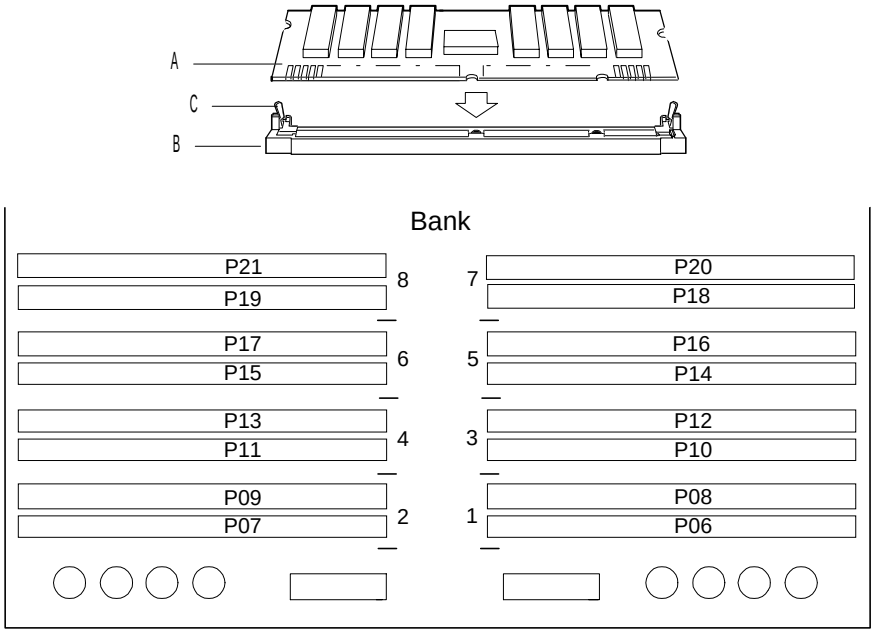
1. Power off the system and remove the left side panel as described earlier in this chapter.

Notice: Observe static precautions. Use an antistatic wrist strap. Hold DIMMs only by their edges.

2. Holding the DIMM module only by the edges, remove it from its antistatic package.

3. DIMMs are keyed so they can only be inserted one way. Position the DIMM over the socket on the board (Figure 5-7, A and B). The notches in the bottom edge of the DIMM mates with the raised bumps in the DIMM socket.

Figure 5-7. Inserting Memory DIMMs



4. Press down evenly on the DIMM until it seats correctly. The white levers on the sockets are not "tools" to aid in the insertion, only to keep the DIMM's in place and to aid in extraction. The levers should click in place once the DIMM is fully inserted.

5. Repeat the above steps to install any remaining DIMMs.

6. Replace the left side panel and turn on the system.

7. Run the BIOS Setup to confirm the DIMMs are installed correctly.

Removing DIMMs

1. Power off the system and remove the left side panel as described earlier in this chapter.

Notice: Use extreme care when removing a DIMM. Hold DIMMs only by their edges. Place them on an antistatic surface; do not slide them across any surface. Applying too much pressure can break the retaining clips or damage the socket slot. Apply only enough pressure on the retaining clips to release the DIMM.

2. Remove the DIMM modules one at a time starting from the highest numbered sockets.

3. To remove each DIMM, gently spread the retaining clips (Figure 5-7, C) just enough so that you can pull the top edge of the DIMM away from the clips.

4. Carefully lift the DIMM away from the socket and store it in an antistatic package.

5. Repeat the above steps to remove the remaining DIMMs.

Processors

The following sections provide procedures for upgrading and configuring the processors in your system. Topics covered include:

- Removing the CPU board support panel
- Removing the CPU board and protective cage from the CPU board
- Adding or removing processors
- Attaching the protective cage on the CPU board and installing the CPU board
- Installing the CPU board support panel.

Warning: If the system has been running, any processor and heat sink already installed will be hot. To avoid the possibility of a burn while removing the CPU board, let the components cool for 10 minutes before continuing with the procedures described here

Notice: Electrostatic discharge (ESD) can damage add-in boards and other components; place them on an antistatic surface. Modify the CPU board only at an ESD workstation. Otherwise, wear an antistatic wrist strap attached to chassis ground.

Note: The HX4100 server can be purchased with a single power supply. If you are adding a second processor to a single power supply HX4100, you must also add a second power supply.

Removing the CPU Board

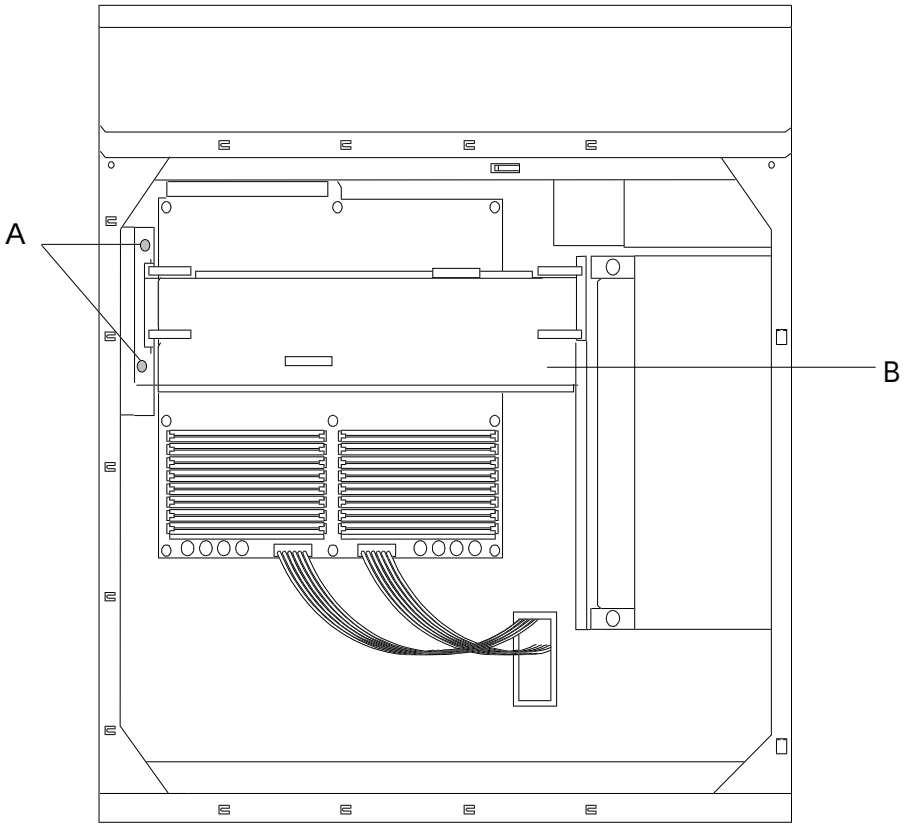
The system has a primary and secondary CPU boards. These boards contain either two or three processor sockets and voltage module sockets to power each processor.

1. Power off the system and remove the left side panel as described earlier in this chapter.

Notice: Observe static precautions. Use an antistatic wrist strap.

2. A metal panel supports the primary and secondary CPU boards (Figure 5-8, B). To remove a CPU board, you must remove this support panel. The support panel is secured to the chassis by two pins (Figure 5-8, A). Release the support panel pins by pulling them towards you (listen for two clicks).

Figure 5-8. Removing CPU Board Support Panel

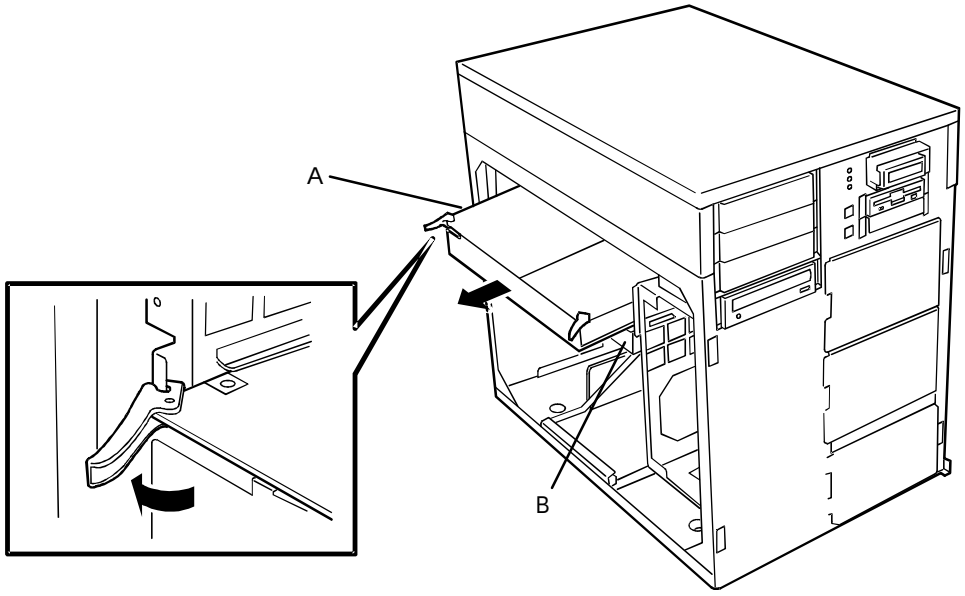


3. Grasp the left side of the support panel and swing it away from the chassis to remove it. Set the support panel aside for later installation.

Notice: To prevent damage to the CPU base board from a partially inserted CPU board and to provide proper cooling and airflow, always install the metal support panel before installing the chassis side panels and top cover and turning on the system. Operating the system without this support panel in place can damage system parts.

4. Open the ejectors on both sides of the CPU board you want to modify. The primary CPU board is the top board (Figure 5-9, A) and the secondary CPU board is the bottom board (Figure 5-9, B).

Figure 5-9. CPU Board Ejectors

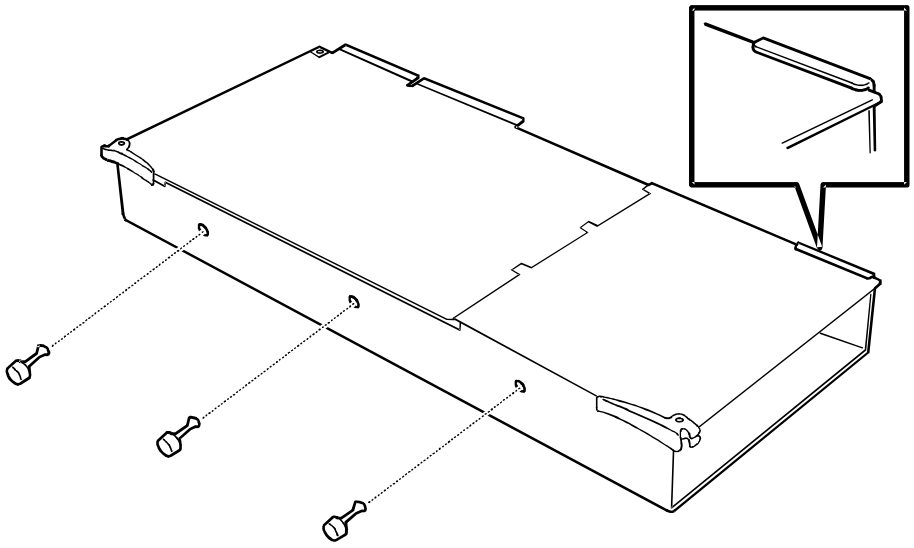


5. Holding the CPU board by its edges, carefully pull it out until the edge connectors are free.

6. Place the CPU board on an antistatic surface. Store the CPU board in an antistatic protective wrapper if you are not installing or removing a processor at this time.

7. The CPU protective cage is secured to the CPU board by three nylon rivets (Figure 5-10). Remove the three nylon rivets and store them in a safe place for reuse.

Figure 5-10. CPU Board Protective Cage



Installing a Processor

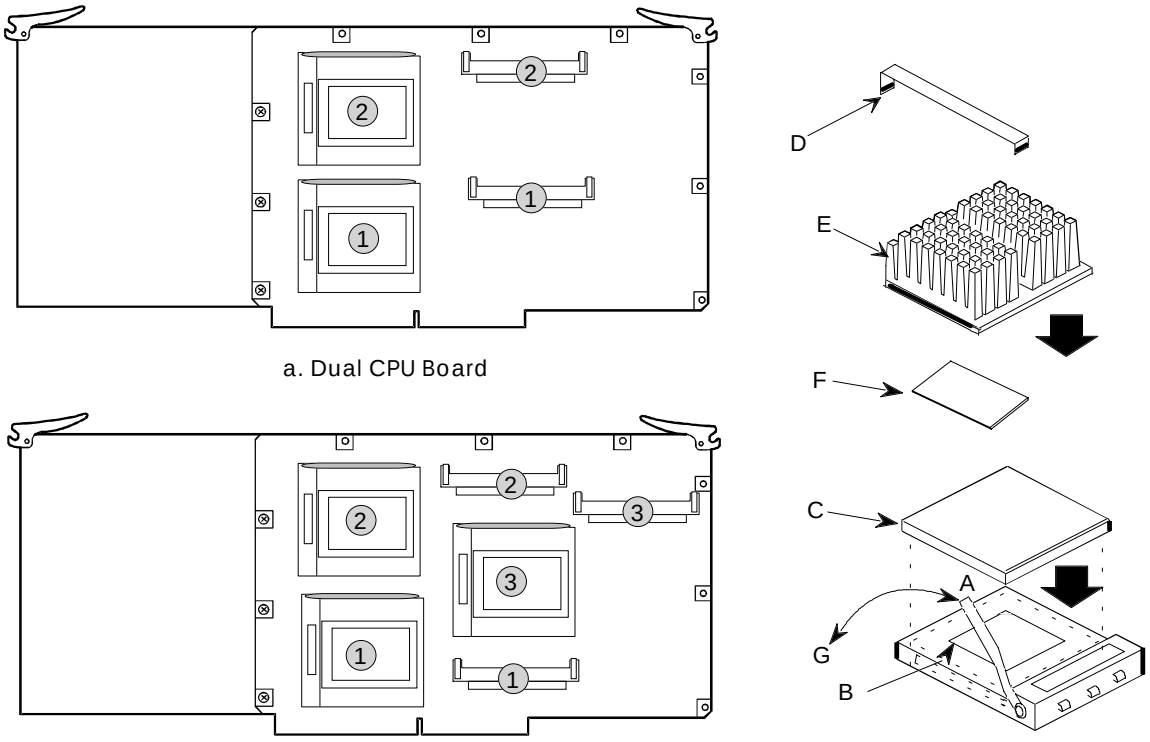
The CPU base board has two connectors for CPU boards, a primary (top connector) and a secondary (lower connector). A CPU board can be either a dual or triple CPU board. Processors are added to the primary CPU board first. Once the primary CPU is fully populated, processors are added to the secondary CPU board.

The processor upgrade kit contains a DC to DC converter board, processor chip, heat sink pad, heat sink retention clip, and heat sink. The heat sink pad attaches to the bottom of the heat sink and the retention clip holds the heat sink to the ZIF socket. The dark circled numbers in Figure 5-11 illustrate the sequence the processor upgrade kits should be added to the system

When adding additional processors, use the same type and speed as the processors previously installed in your system. Contact your sales representative.

Notice: Installing processors that are of a different type than the installed processors, will result in system damage. Do not touch or bend the processor's exposed pins.

Figure 5-11. Installing an Optional Pentium Processor



To install an optional processor upgrade kit:

1. Remove the CPU board as described earlier in this section.

Notice: Observe static precautions. Use an antistatic wrist strap.

2. If the processor socket has a protective plastic cap, remove the cap by lifting it away from the ZIF socket. Raise the lever on the socket to the up position (Figure 5-11, A).

3. Position the processor (C) over its ZIF socket(B) so that the processor pins align with the socket holes. Note that the pins get denser as they get closer to the lever on the ZIF socket.

4. Insert the processor pins into the socket. Apply pressure equally over the top surface of the processor until it seats in the socket. The processor should fit easily, do not force it into the socket.
5. Push ZIF socket lever down (G) until it snaps into the locked position.
6. Remove the protective paper from the adhesive side of the heat transfer pad (F). Align the pad with the raised position on the bottom of the heat sink (E) and press the adhesive side of the pad onto the bottom of the heat sink.
7. Position the heat sink above the processor so the retention clip (D) aligns with the tabs on either side of the ZIF socket. Engage one end of the retention clip over the tabs at the base of the socket and press the other end of the retention clip over the other socket tab.
8. Locate the DC to DC converter board. The board connector is keyed so it can only be inserted one way. Position the board over the socket on the board and press down evenly on the board until it seats correctly.
9. Record the processor in the equipment log.
10. Install the CPU board back into the system as described later in this chapter.

Removing a Processor

Refer to Figure 5-11 while performing the following procedures. To remove a processor:

1. Remove the CPU board as described earlier in this section.

Notice: Observe static precautions. Use an antistatic wrist strap.

2. Push one end of the heat sink retention clip (Figure 5-11,.D) to release the clip from the tabs on the ZIF socket. Remove the heat sink.

3. Raise the lever on ZIF socket to the up position (A).

4. Grasp the opposite sides of the processor, apply equal upward force on each side and rock it from side to side until it releases. Place the processor in an antistatic package.

5. Push the lever on the ZIF socket down until it snaps into the locked position (Figure 5-11, G).

6. Install the processor CPU board back into the system as described later in this chapter.

Installing the CPU Board

Note: Always install the lower (secondary) CPU board first.

1. Be careful not to touch components or gold edge connectors on the processor/memory board as you remove it from its protective wrapper. Place board component-side up on an antistatic surface.

2. Using the three nylon rivets, mount the CPU protective cage onto the CPU board (Figure 5-10). Be sure the cage frame is firmly hung on the edge of the CPU board.

3. On the CPU base board, locate the CPU board connector. Hold the CPU board by its edges and start to insert it into the slot guides.

4. Do not press in on the board yet! Ease board into the slot guides until it is just touching the connector on the CPU base board.

Caution: Before pressing the board firmly into the CPU base board connector, confirm visually that the board edge connectors are correctly oriented—not too low or high—at the CPU base board connector.

5. Be sure the ejector levers are extended so they can engage the chassis frame.

6. Press the board carefully but firmly into the CPU base board connector to seat the board. Close the ejectors on both sides of the CPU board (Figure 5-9). Be sure the ejector is firmly hooked in the chassis frame before closing the ejector.

Caution: Before applying power, do one more check. Make sure the CPU board is completely seated in the CPU base board connector before applying power. Incomplete insertion can result in damage.

7. A metal panel supports the primary and secondary CPU boards (Figure 5-8, B). Hook the right side of the support panel into the chassis frame and swing the support panel into position so that the rear edge of the CPU boards fits snug against the panel.

8. The support panel is secured to the chassis by two pins (Figure 5-8, A). Push on the support panel pins until they click in the locked position.

9. Replace the left side panel and turn on the system.

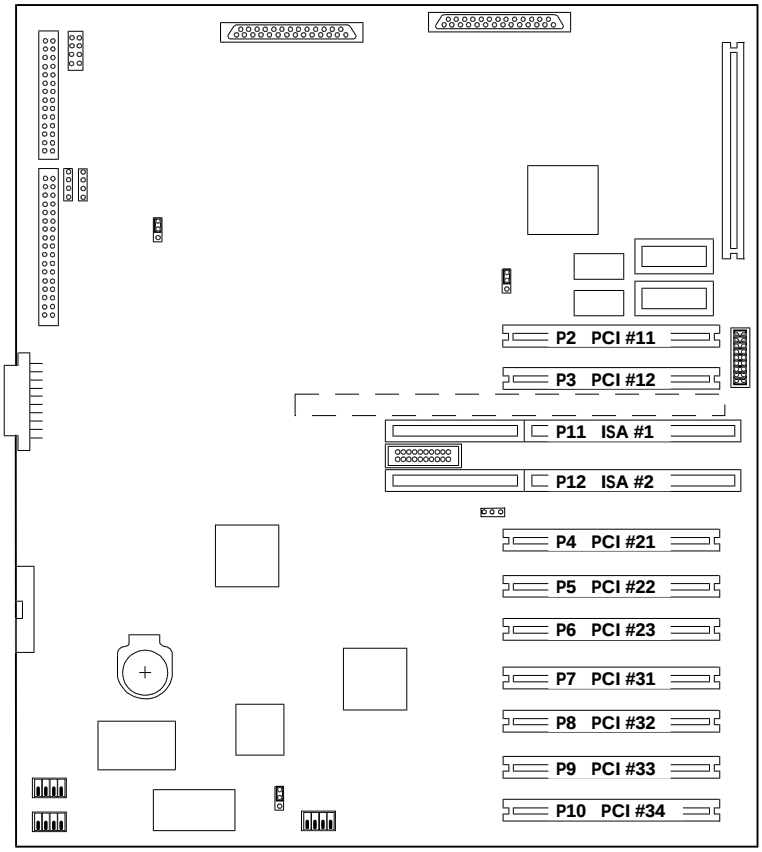
10. Run the BIOS Setup to confirm the processors are installed correctly.

Option Boards

This section describes how to install and remove ISA and PCI option boards. The system I/O board has two dedicated ISA bus master expansion slots and nine dedicated PCI bus expansion slots (see Figure 5-12).

The high-performance PCI local bus allows the adoption of newer networking technology, such as 100 Mega-bit/second Ethernet NICs, with a minimum of effort and without concern for I/O bottlenecks. The PCI local bus offers up to 133 Mega-byte/second bandwidth.

Figure 5-12. PCI and ISA Slot Locations



Installation Considerations

Newer adapters, designed for Plug-and-Play systems, are automatically configured by the system without any user intervention. Older ISA adapters must be manually configured as detailed below. Once the manual configuration is complete, the Plug-and-Play adapters are configured around the manually configured adapters without causing any resource conflicts.

ISA adapters can be Plug-and-Play. ISA adapters that are not Plug-and-Play must be manually configured following the instructions supplied with the board. The configuration is defined to the system by creating the ISA configuration file when running the RCU. If you are adding a non-Plug-and-Play ISA option board, run the RCU before installing the board. For details on running the SCU, refer to Chapter 4.

On system power-up and reboot, BIOS initiates a scan sequence looking for Plug-and-Play option boards installed since the last power up or reboot. The Plug-and-Play scan sequence is as follows:

- First - BIOS scans for any Plug-and-Play ISA option board installed in slots P11 - P12, starting with slot P11.

- Second - BIOS scans for any Plug-and-Play PCI option board installed in slots P2 - P10, starting with slot P2.

Always install option boards in the first available slot in the scan sequence. As an example, if there are PCI option boards installed in slots P2 and P3 of your system and slots P4 - P10 are vacant, install your Plug-and-Play option board into slot P4.

Controller/Adapter Hardware Configurations

Table 5-1 lists the option boards you may add to your system and provides information on slot location.

Table 5-1. Option Board Hardware Configurations

OPTION BOARD	IRQ[2]	MEMORY ADDRESS	I/O ADDRESS
SMC 9432TX (1st)[3]	Set by BIOS	Set by BIOS	Set by BIOS
SMC 9432TX (2nd)[3]	Set by BIOS	Set by BIOS	Set by BIOS
3COM 3c905B (1st)[3]	Set by BIOS	Set by BIOS	Set by BIOS
3COM 3c905B (2nd)[3]	Set by BIOS	Set by BIOS	Set by BIOS
Adaptec 3940UW[1, 4]	Set by BIOS	Set by BIOS	Set by BIOS
Mylex DAC960[1, 4]	Set by BIOS	Set by BIOS	Set by BIOS
Onboard 7895 SCSI	Set by BIOS	Set by BIOS	Set by BIOS

1. For disk controllers plugged into slots and the onboard disk controllers, the sequence for BIOS scanning to determine the primary (Boot) disk controller is:

   ISA slots P11 and P12
   PCI slot P2 and P3 (first PCI bus)
   Onboard 7895 SCSI (first PCI bus)
   PCI slot P4 through P6 (second PCI bus)
   PCI slot P7 through P10 (third PCI bus).

   It is recommended that the BIOS be disabled on all SCSI controllers except for the controller with the boot disk drive attached (see The SCSISelect Utilities in the Configuring Your System chapter. This saves memory address resources and provides control over the boot device independent of board slot locations.

2. Additional IRQ's can be made available as follows:

   Disabling Comm Port 1 = IRQ4 is available
   Disabling Comm Port 2 = IRQ3 is available
   Disabling Parallel Port = IRQ7 is available.

3. A maximum of five LAN channels consisting of any combination of single or dual channel. Install ISA LAN card in the first available ISA slot from the top. Install PCI LAN card in the first available PCI slot from the top.

4. A maximum of four SCSI controllers may be installed. Install the first controller card in PCI slot P2 and the second controller in PCI slot P3.

Installing an Option Board

1. Power off the system and remove the top cover as described earlier in this chapter.

Notice: Observe static precautions. Use an antistatic wrist strap.

2. Remove the option board from its protective wrapper, holding the board only by the edges. Do not touch the board components or the gold connectors.

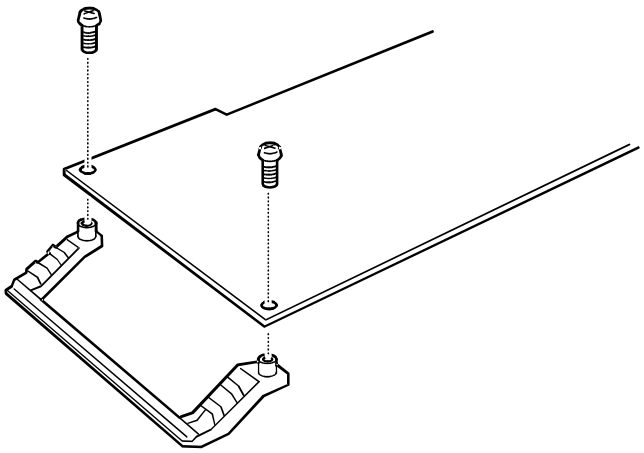
3. Record the option board serial number in the equipment log.

4. Set any board jumpers or switches as described in the documentation that comes with the option board.

   Note: Refer to the documentation accompanying the option board for information on whether the board is to be installed in a PCI or ISA expansion slot.

5. If the PCI board has a handle attached to one end, remove the handle (Figure 5-13).

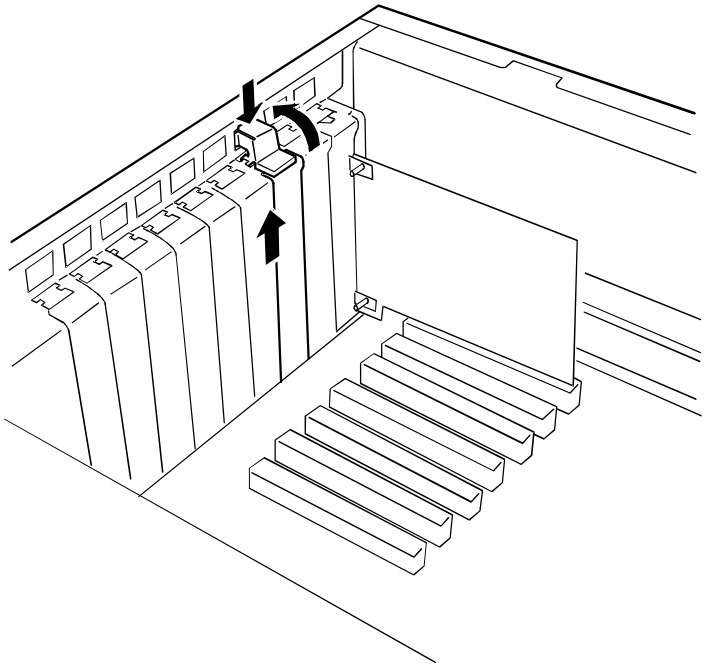
Figure 5-13. Removing the Board Handle



6. Refer to Table 5-1 to determine the recommended option board slot assignment and configuration parameters. Refer to Figure 5-12 to determine system board slot locations.

7. Determine the expansion slot cover that corresponds to desired expansion slot. Release the cover lock by pressing on the cover tab and remove the expansion slot cover (Figure 5-14).

Figure 5-14. Removing the Expansion Slot Cover

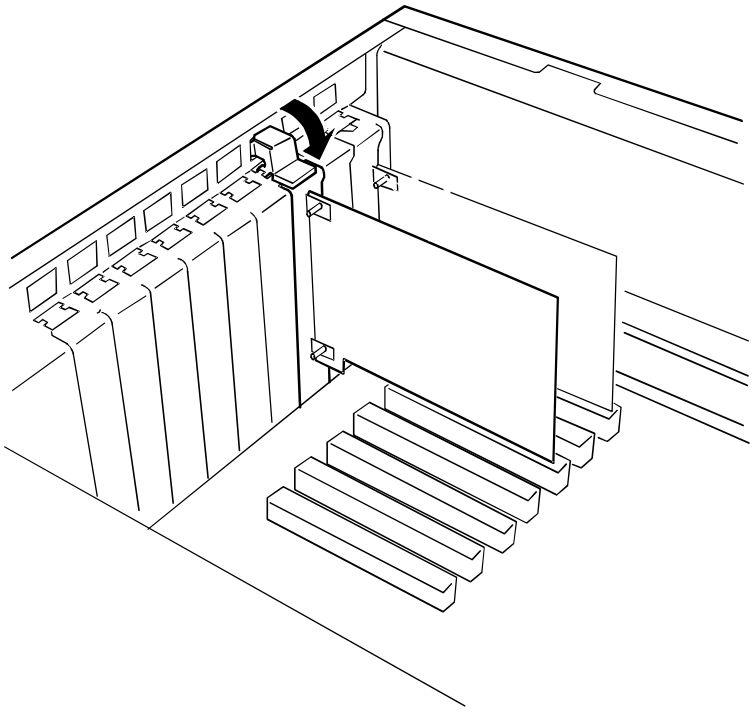


8. Holding the board by its top edge or upper corners, firmly press the board into an expansion slot on the system I/O board. The tapered foot of the option board retaining bracket must fit into the mating slot in the expansion slot frame.

9. The retaining bracket fits into the space that was occupied by the expansion slot cover. Secure the expansion board by pushing down on the cover tab (Figure 5-15).

10. If you have installed a SCSI host adapter board, go to Appendix A for procedures on cabling these boards into the system. For all other boards, continue with step 11.

Figure 5-15. Installing an Option Board



11. Connect any external cables (if they are needed) to the installed option board.

12. Replace the top cover and power on the system.

Removing an Option Board

Note: Expansion slot covers must be installed on all vacant slots to maintain the electromagnetic emissions characteristics of the system and to assure proper cooling of the system components.

1. Power off the system and remove the top cover as described earlier in this chapter.

2. Disconnect any cables attached to the option board you are removing.

3. Determine the expansion slot retaining bracket that corresponds to desired expansion slot and release the cover lock by pressing on the cover tab (Figure 5-14).

4. Hold the board at each end, and carefully rock it back and forth until the edge connectors pull free. Make sure that you do not scrape the board against other components.

5. Remove the board from the expansion slot and place it in an antistatic wrapper.

6. If you are replacing a board, go to "Installing an Option Board" earlier in this chapter, otherwise continue.

7. Install an expansion slot cover over the vacant slot. Secure the cover by pushing down on the cover tab (Figure 5-15).

8. Replace the top cover and power on the system.

9. If you removed an non-Plug-and-Play ISA option board, run the RCU to configure the system as described in the *Configuring Your System* chapter.

Power Supply

The following sections provide procedures for installing an additional power supply, removing a power supply, or swapping out a faulty power supply.

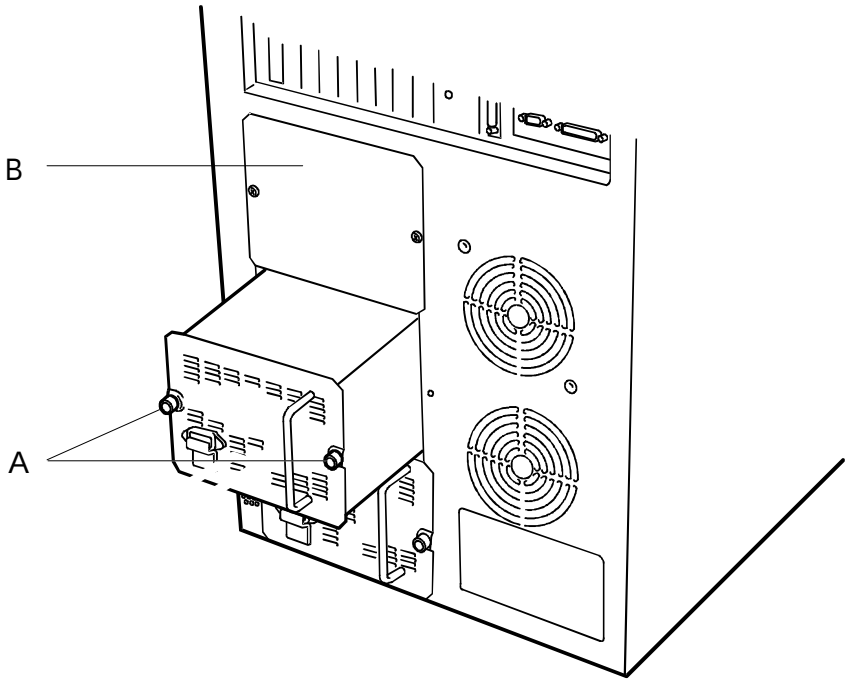
Installing a Power Supply

Use this procedure to add an optional power supply to your system.

Note: The HX4100 server can be purchased with a single power supply if the server has only one processor and one hard drive cage. If a processor or hard drive cage is added to this single power supply server, you must add an additional power supply.

1. Power off the system.
2. Each empty power supply expansion bay has a blank cover. From the bay where you want to install a power supply, remove the two screws securing the blank cover (Figure 5-16, B).
3. Slide the new power supply into the chassis and tighten the thumb screws (Figure 5-16, A) that secure the power supply.
4. Connect the power cord from the AC wall outlet and to the input receptacle on the rear of the new power supply.
5. Power on the system.

Figure 5-16. Power Supply



Removing a Power Supply

If the LED indicators on a power supply are lit, it is recommended that power to the system be turned off before removing the power supply. To remove a power supply, perform the following steps.

1. Power off the system.

2. Disconnect the power cord from the AC wall outlet and from the input receptacle on the rear of the power supply you are removing.

3. Loosen the thumb lock screws (Figure 5-16, A) that secure the power supply.

4. Hold the handle on the power supply and pull the power supply out of the system.

5. If you are replacing a power supply, go to “Installing a Power Supply” in this chapter, otherwise power on the system.

Hot-Swapping a Power Supply

If you are swapping out a faulty power supply, you can pinpoint which one to remove by checking the status LED indicators on each supply. If either or both of the LED indicators are off, the power supply can be hot-swapped.

If the LED indicators on a power supply are lit, it is recommended that power to the system be turned off before removing the power supply. To remove a power supply, perform the following steps.

1. Disconnect the power cord from the AC wall outlet and from the input receptacle on the rear of the power supply.

2. Loosen the thumb lock screws (Figure 5-16, A) that secure the power supply you want to replace.

3. Hold the handle on the power supply and pull the power supply out of the system.

4. Slide the replacement power supply into the chassis and tighten the thumb screws (Figure 5-16, A) that secure the power supply.

5. Connect the power cord from the AC wall outlet and to the input receptacle on the rear of the new power supply.

Removable Media Devices

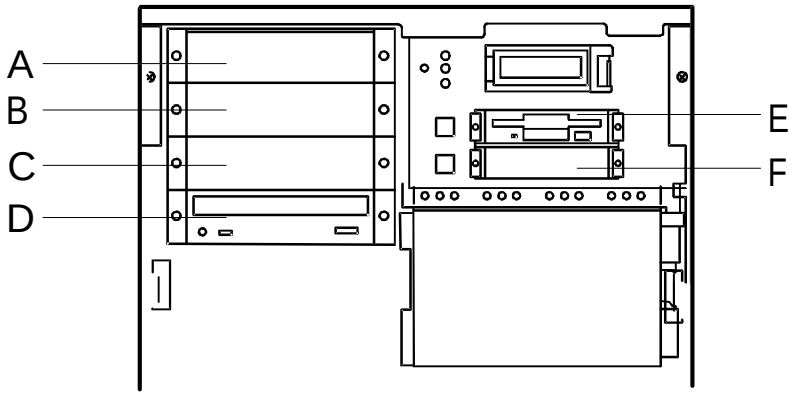
A CD-ROM reader is always mounted in bay D. SCSI removable media devices can be installed in peripheral bays A, B, and C. SCSI devices should be installed in the first available bay from the bottom (bay D). Figure 5-17 illustrates the recommended removable media configuration. These bays are intended to hold tape, CD-ROM, or other removable media drives. Narrow SCSI drives in the 5 1/4-inch bays receive control signals from channel B of the SCSI-2 controller on the system I/O board.

Notice: The SCSI termination resistors must be installed in the last SCSI drive of the daisy chain cabling (bottom media bay D). All other devices must have terminators removed.

Hard disk drives cannot be installed in a 5 1/4-inch external bay because the drive generates EMI, is more susceptible to ESD, and would not have sufficient cooling.

A 1.44 MB diskette drive is always mounted in bay E. A second 3 1/2-inch device can be installed in bay F.

Figure 5-17. Removable Media Device Bays



Removable Media Device Bays

A 5 1/4-inch expansion bay

B 5 1/4-inch expansion bay

C 5 1/4-inch expansion bay

D CD-ROM reader

E 1.44 MB diskette

F 3 1/2-inch expansion bay

Bay A SCSI QIC Tape. SCSI DAT Tape. Device must have the internal SCSI terminators **removed**.
BAY B Second SCSI CD-ROM. SCSI QIC Tape. SCSI DAT Tape. Device must have the internal SCSI terminators **removed**.
Bay C SCSI QIC Tape. SCSI DAT Tape. Device must have the internal SCSI terminators **removed**.
Bay D SCSI CD-ROM (always installed). Device must have the internal SCSI terminators **installed.**
Bay E 1.44 MB diskette drive (always installed).
Bay F Second 3 1/2-inch device.

Installing a 5 1/4-Inch Device or 3 1/2-Inch Diskette Drive

Caution: CD-ROM devices contain a laser system and are classified as CLASS 1 LASER PRODUCTS. In case of any trouble with a CD-ROM, please contact your nearest service representative. To prevent direct exposure to the laser beam, do not try to open the enclosure.

Use of controls or adjustments or performance of procedures other than those recommended by the manufacturer may result in hazardous radiation exposure

Note: If you are replacing a diskette drive in Bay E or installing a diskette drive in bay F, use the internal diskette drive cables provided with the system. If you are installing a SCSI device in bays A, B, or C, you must use the internal SCSI cables. Contact your sales representative or dealer for a list of approved optional peripheral devices.

1. Power off the system. Remove the left front door and the top cover as described earlier in this chapter.
2. Each empty media or diskette drive bay has a blank panel tray. From the bay where you want to install a drive, remove the two screws securing the blank panel tray to the chassis (Figure 5-18).

   Note: When installing a full height 5 1/4-inch device, remove two blank panels.

3. Grasp the blank panel tray and slide it out of the bay.
4. Remove the two screws securing each side rail to the blank panel tray (Figure 5-19).
5. Save the blank panel tray and screws to reuse if you remove a drive from a bay later and do not reinstall one.

Figure 5-18. Removing Blank Panel Tray

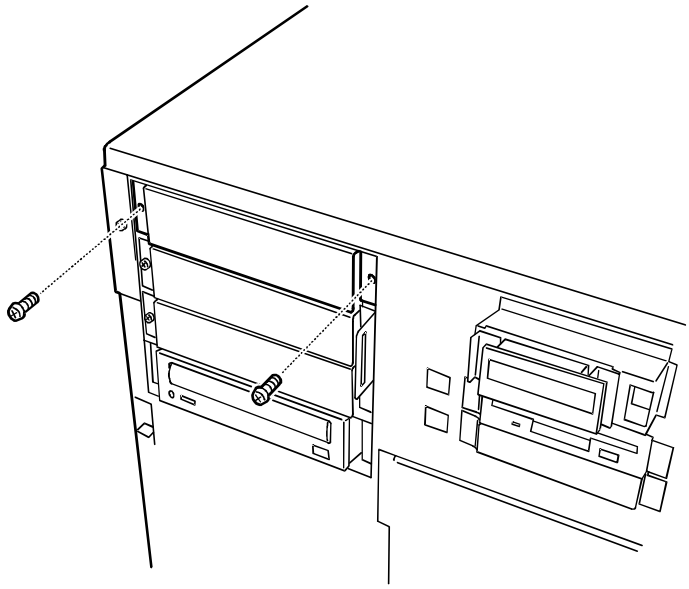
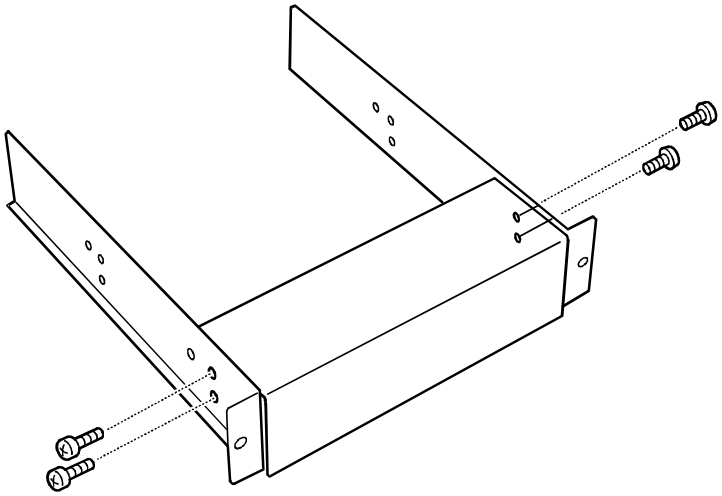


Figure 5-19. Removing Side Rails



6. Remove the device from its protective wrapper and place it on an antistatic surface. Record the drive model and serial number in the equipment log.

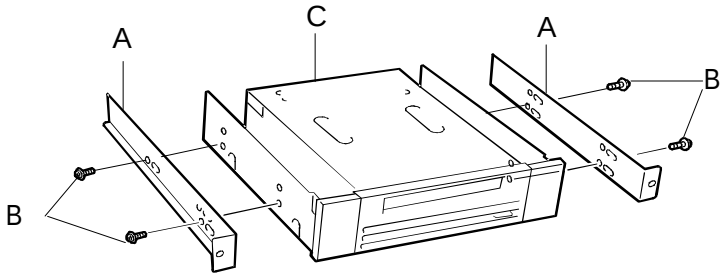
7. Set any device jumpers or switches on the device. Refer to the installation procedures that came with the device.

Notice: SCSI termination resistors for the 5 1/4-inch devices must be installed in the last SCSI device of the daisy chain cabling (bottom media bay D). All other 5 1/4-inch devices must have terminators removed.

8. Using the four screws supplied with the drive, reinstall the side rails just removed from the blank panel tray (Figure 5-20, A). The rails for each side of the device are identical.

   Note: Do not use the screws that were used to secure the blank panel tray

Figure 5-20. Attaching Side Rails to a Device



Attaching side rails to removable media drive

A Side rails

B Four drive mounting screws

C Drive

9. Engage the device side rails into the bay guide rails (see Figure 5-21). Ensure that the device side rails (see Figure 5-22, A) are inside the bay guide rails exactly as shown in Figure 5-22, B.

10. Push the drive into the bay until the screw holes of the side rails are directly in front of the chassis screw holes and secure with the screws previously removed.

Figure 5-21 Installing Device

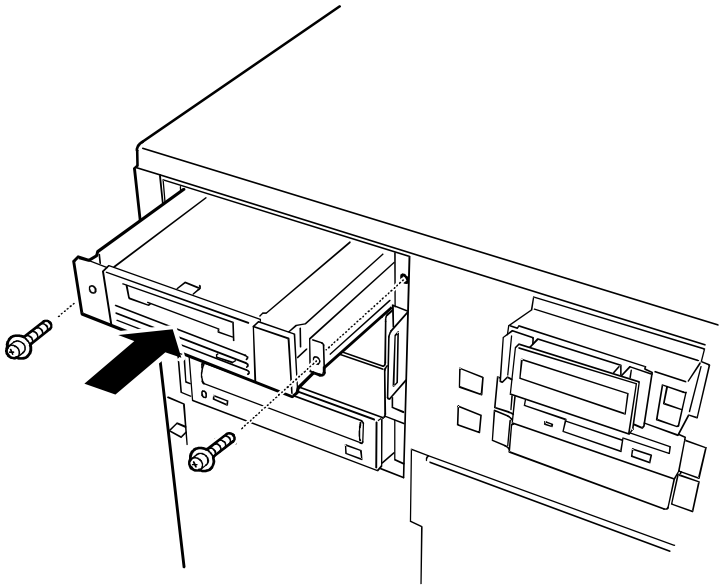
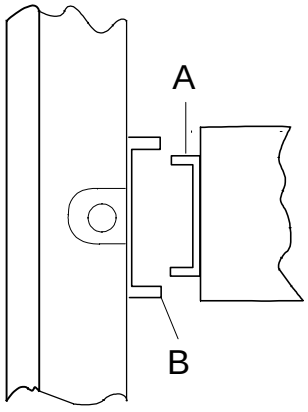


Figure 5-22. Engaging the Device Side Rails to the Bay Guide Rails



11. Connect a power cable to the back of the drive (see Figure 5-23).

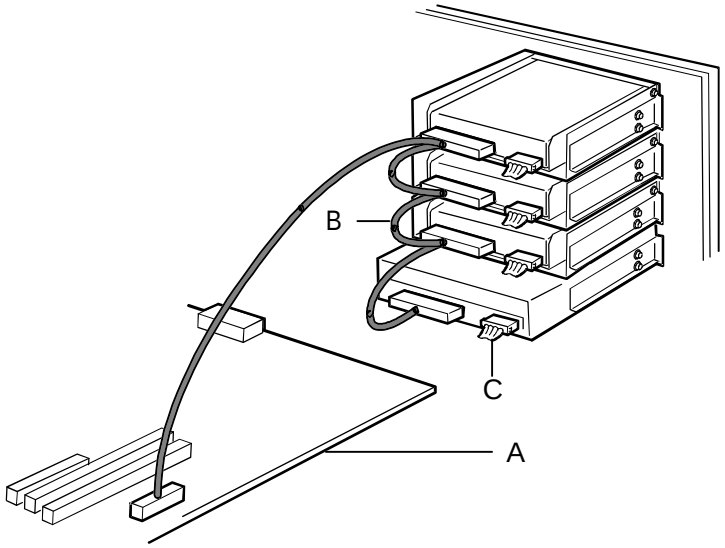
    Note: For 5 1/4-inch devices power cables are provided in the chassis for removable 5 1/4-inch media drives (including the CD-ROM that is factory-installed). These power cables are interchangeable for 5 1/4-inch devices only; you can connect any one of them to any device you install in the 5 1/4-inch media bays. The connectors are keyed and can be inserted in only one way.

    For 3 1/2-inch diskette drives power cables are provided in the chassis (including the diskette drive that is factory-installed). The connectors are keyed and can be inserted in only one way.

12. Connect the data cable (Figure 5-23) to the device; the connector is keyed and can be inserted only one way.

    Note: For the 5 1/4-inch devices be certain that you are using the 50-pin SCSI data cable. This cable comes from the system I/O board to the removable media bays and ends at the CD-ROM reader in bay D. Do not confuse this cable with the 34-pin diskette drive cable which begins on the system I/O board and ends at the diskette drive in bay F.

Figure 5-23. Installing Device Cables



A System I/O board

B Signal cable

C Power cable

13. Reinstall the top cover and the left front door. Power on the system.

Removing a 5 1/4-Inch Device or 3 1/2-Inch Diskette Drive

1. Power off the system. Remove the left front door and the top cover as described earlier in this chapter.
2. Disconnect the signal and power cables from the back of the drive (Figure 5-23).
3. Remove the two screws that secure the device to the front of the chassis (Figure 5-21).
4. Slide the drive out the front of the bay, and place on an antistatic surface.
5. Remove and save the side rails and screws (Figure 5-20).
6. Place drive in an antistatic wrapper.
7. To cover an empty bay, install a blank panel tray in the bay.(Figure 5-18).
8. Reinstall the top cover and the left front door. Power on the system.
9. Remove the drive serial number from the equipment log.

Hard Disk Drives

The following sections provide procedures for installing an additional disk drive, removing a disk drive, or swapping out a faulty disk drive from one of the three hot-swap drive cages. The 3 1/2-inch SCSI drives must use the industry standard 80-pin Single Connector Attachment (SCA) connector. Each drive must be installed in a carrier.

Note: To order a carrier contact your sales representative or dealer.

- If installing new drives, follow an installation scheme starting with the bottom left drive. Fill the cages left to right.
- If an individual SCSI drive fault LED (yellow light) is on steadily, this indicates that the drive below it has been flagged as faulty. Follow the procedure described in this section to remove the faulty drive and swap in a good one.

Note: Swap SCSI drives without turning off power. This is one of the few system procedures that is safe to do with the system power left on. This is true only if a Redundant Array of Independent Disks (RAID) controller module is installed and only for the drive/carrier assemblies in the hot-swap cages, *not for drives in any other bays*.

Notice: ESD can damage disk drives, boards, and other parts. This system can withstand normal levels of environmental ESD while you are hot-swapping SCSI hard drives. However, we recommend that you do all procedures in this chapter only at an ESD workstation or provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground—any unpainted metal surface—on your system when handling parts.

Installing a Hard Drive

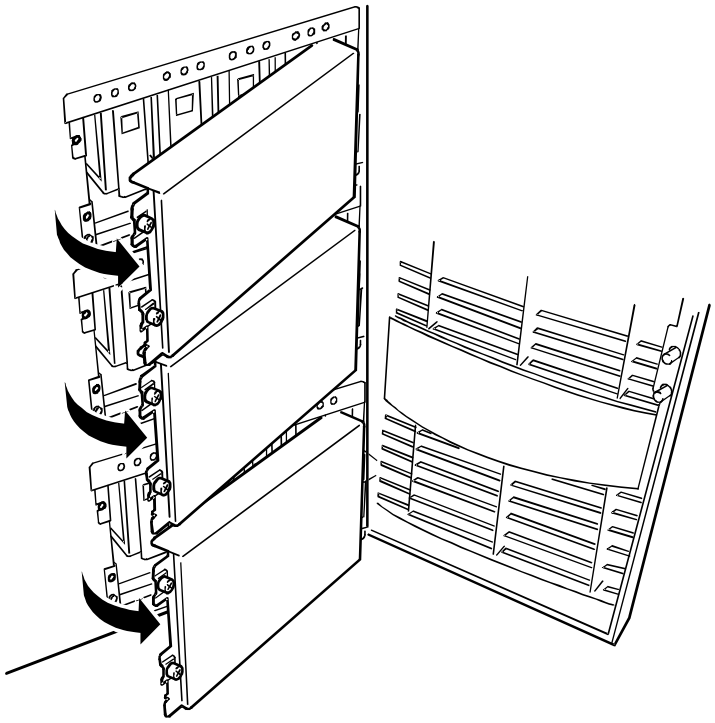
Use this procedure to add an optional hard drive to your system.

1. Power off the system. If locked, unlock and open the right front door.

2. Determine which hard drive cage will contain the new hard drive. Open the EMI metal panel in front of the hard drive cage by turning its two thumb lock screws counter clockwise (see Figure 5-24).

3. The hard drive cage has four slots for mounting the hard drives. Confirm which slot of the hard drive cage the hard drive will be mounted. The SCSI ID (0 through 4) is determined by the slot number from left to right.

Figure 5-24. Hard Disk Drive Cages



Three hard drive cages

(EMI panel and exterior door shown open)

Notice: Observe static precautions. Use an antistatic wrist strap.

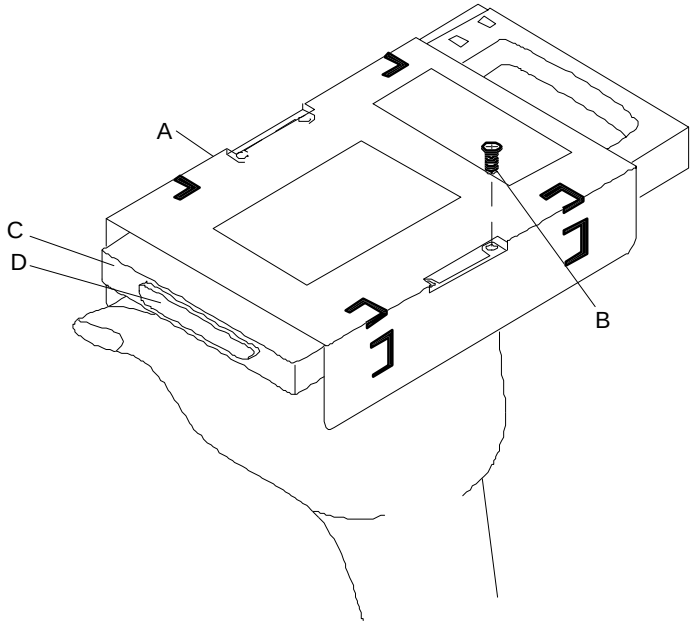
4. The drive carrier is shipped with the add-on drive. Remove the new drive from its protective wrapper and place it on an antistatic surface. Record the drive model and serial numbers in the equipment log.

5. Position the drive so its SCA connector is near the top surface of the drive. Place drive on the antistatic surface again. Slide the drive into the carrier with its SCA connector facing toward the front of the carrier (open end).

6. While holding the drive in the carrier with your left hand, align the drive's screw holes with the carrier's screw holes and insert the four screws of appropriate size and length (see Figure 5-25).

7. Pressing the lock button on the carrier handle, open the handle. Align the drive/carrier assembly so it engages the guide rails in the hard drive cage (see Figure 5-26).

Figure 5-25. Installing Hard Disk in Carrier



Installing 3 1/2inch hard disk drive in carrier for hot-swap bays

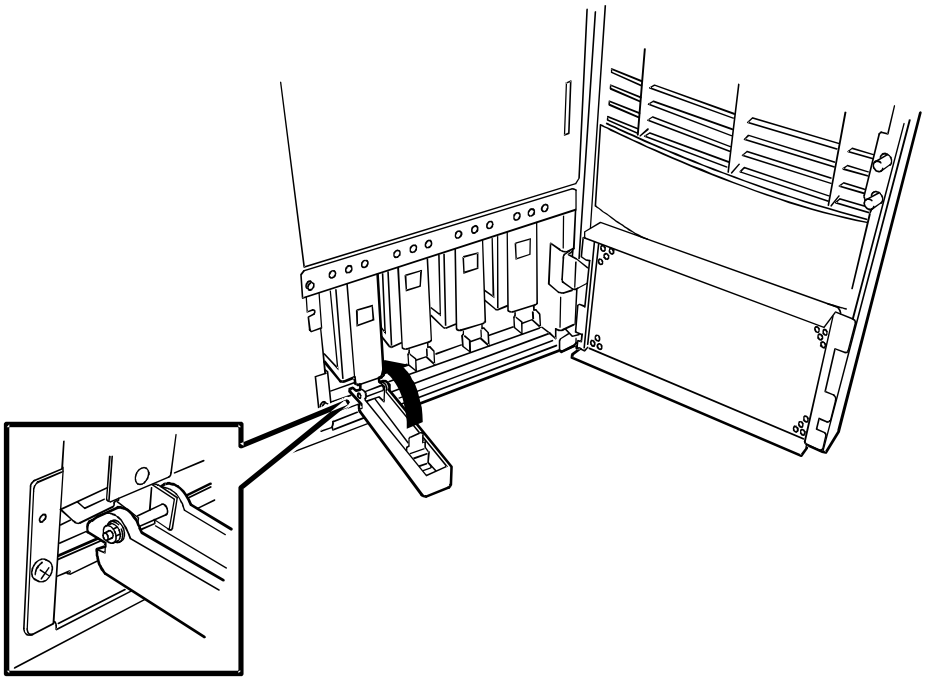
A Carrier

B Four screws

C Hard disk drive

D SCA connector

Figure 5-26. Installing Carrier in the System



8. Gently push the assembly into the bay until the drive docks with the backplane connector. Be sure the hook on the bottom of the handle engages the chassis frame and slowly lift the handle. You will hear a click when the handle locks in place.

9. Close the EMI metal panel, and secure with the two thumb screws.

10. Power on the system and close the front door.

Removing a Hard Drive

Use this procedure to remove a hard drive from your system.

1. Power off the system. If locked, unlock and open the right front door.

2. Determine which hard drive cage contains the hard drive you want to remove. Open the EMI metal panel in front of the hard drive cage by turning its two thumb lock screws counter clockwise (see Figure 5-24).

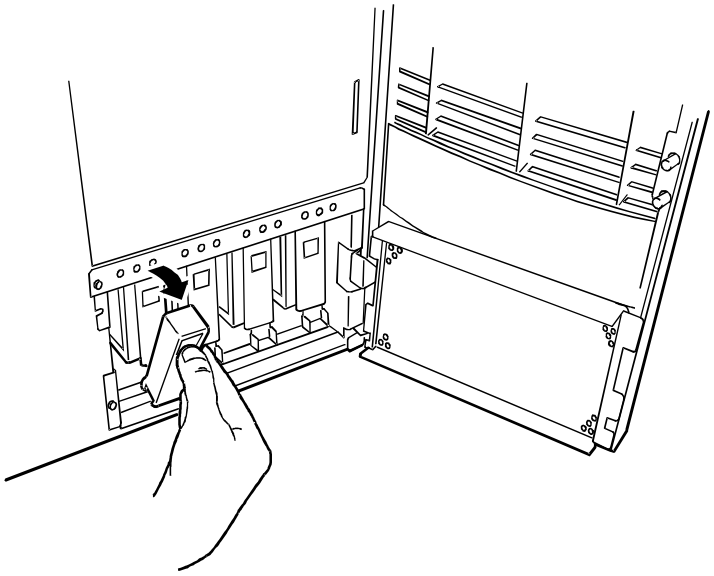
3. The hard drive cage has four hard drive slots. Confirm which slot of the hard drive cage contains the hard drive to be removed.

4. Grasp the handle of the hard disk's carrier and press down on its thumb-release button (see Figure 5-27).

5. Remove the hard disk and place it in an antistatic wrapper. Close the EMI metal panel, and secure with the two thumb screws.

6. Power on the system and close the front door.

Figure 5-27. Removing the Hard Disk Carrier



Hot-Swapping a Hard Drive

If you are swapping out a faulty hard drive, you can pinpoint which drive to remove by checking the status LEDs that occur in sets of three above each of the four drive bays. Refer to "Status LED Indicator Descriptions" in Chapter 2.

Notice: When the SCSI drive fault LED indicates a drive fault (steady yellow light), you can remove the drive and swap in a replacement at any time when the drive is not being accessed, without needing to power down the system. However, drive manufacturers caution against moving a drive that is still spinning because of possible damage to the drive.

1. If locked, unlock and open the right front door.

2. Determine which hard drive cage contains the faulty hard drive. Open the EMI metal panel in front of the hard drive cage by turning its two thumb lock screws counter clockwise (see Figure 5-24).

3. The hard drive cage has four hard drive slots. Check all the drive LEDs to confirm which drive to remove. Refer to "Status LED Indicator Descriptions" in Chapter 2.

Notice: Depending on the drive fault, the drive may be still spinning when you remove it. Follow the next step exactly when removing drives.

4. Grasp the handle of the hard disk's carrier and press down on its thumb-release button (see Figure 5-27). Pull the faulty drive out of the bay far enough to disengage the drive connector from the backplane. Wait 30 seconds until the drive spins down, then remove the drive from the drive bay.

Notice: Observe static precautions. Use an antistatic wrist strap.

5. Place the removed hard drive on an antistatic surface.

6. Remove the replacement drive from its protective wrapper and place it on an antistatic surface. If a drive carrier was not shipped with the replacement drive, remove the carrier from the removed drive.

7. Place the removed hard drive in an antistatic wrapper.

8. Position the replacement drive so its SCA connector is near the top surface of the drive. Place drive on the antistatic surface again. Slide the drive into the carrier with its SCA connector facing toward the front of the carrier (open end).

9. While holding the drive in the carrier with your left hand, align the drive's screw holes with the carrier's screw holes and insert the four screws of appropriate size and length (see Figure 5-25).

10. Pressing the lock button on the carrier handle, open the handle. Align the drive/carrier assembly so it engages the guide rails in the hard drive cage (see Figure 5-26).

11. Gently push the assembly into the bay until the drive docks with the backplane connector. Be sure the hook on the bottom of the handle engages the chassis frame and slowly lift the handle. You will hear a click when the handle locks in place.

12. Close the EMI metal panel, and secure with the two thumb screws.

13. Close the front door.

Installing a Hard Disk Drive Cage

The system has up to three hard disk drive cages that hold up to four disks each (Figure 5-28). Use this procedure to add an optional hard disk drive cage to your system.

Note: The HX4100 server can be purchased with a single hard drive cage. If a hard drive cage is added to this server, you must add an additional controller board (either SCSI or RAID).

Note: The HX4100 server can be purchased with a single power supply. If a hard drive cage is added to this server, you must add an additional power supply.

1. Power off the system and remove the right front door, the top cover, and the right side panel as described earlier in this chapter.

2. Each empty disk drive expansion bay has a blank cover. From the bay where you want to install a hard drive cage, remove the four screws securing the blank cover (Figure 5-29).

Figure 5-28. Hard Disk Drive Cages

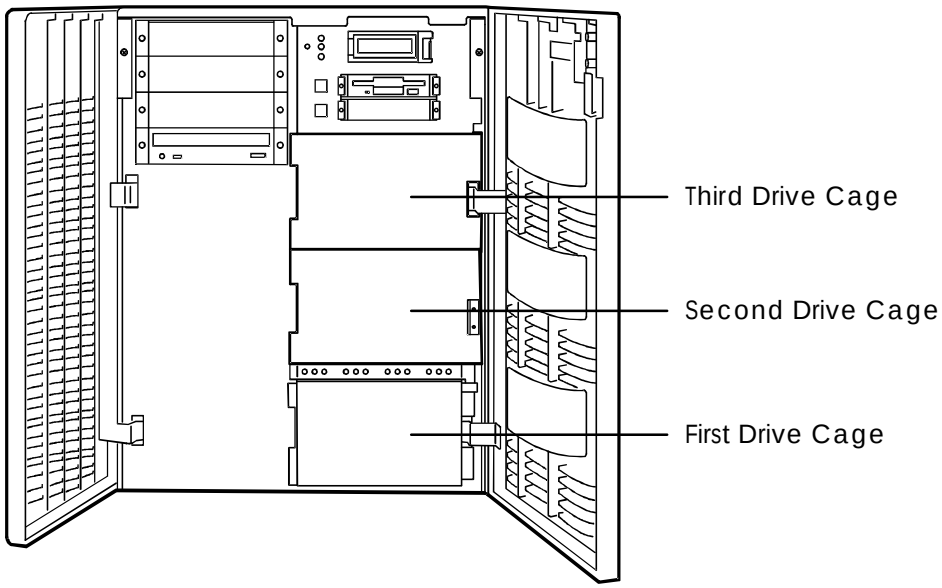
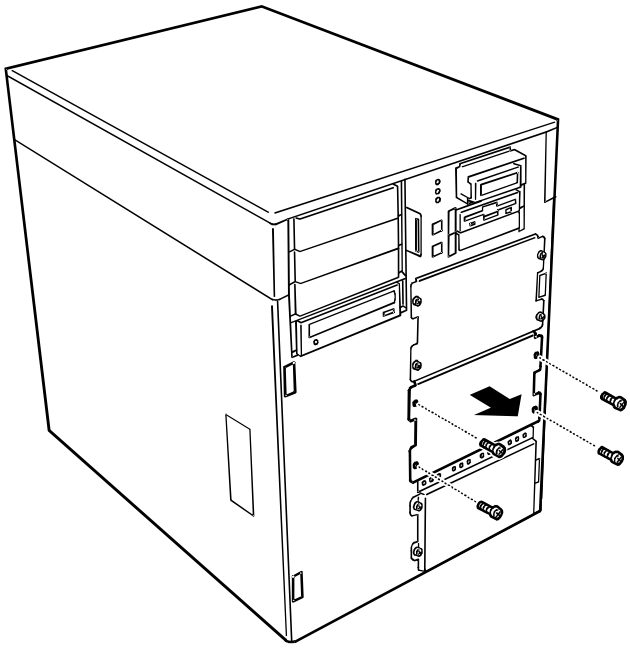
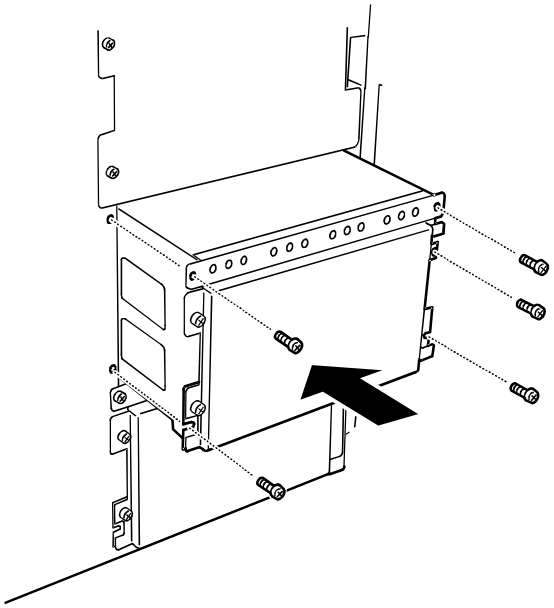


Figure 5-29. Removing Disk Drive Expansion Bay Cover



3. Carefully side the new hard drive cage into the chassis and secure it with five screws (Figure 5-30).

Figure 5-30. Installing Hard Disk Drive Cage



4. Connect the status cable (Figure 5-31, A) to the back of the new hard drive cage; the connector is keyed and can be inserted only one way.

5. Connect a power cable to the back of the new hard drive cage (see Figure 5-31, B or D)).

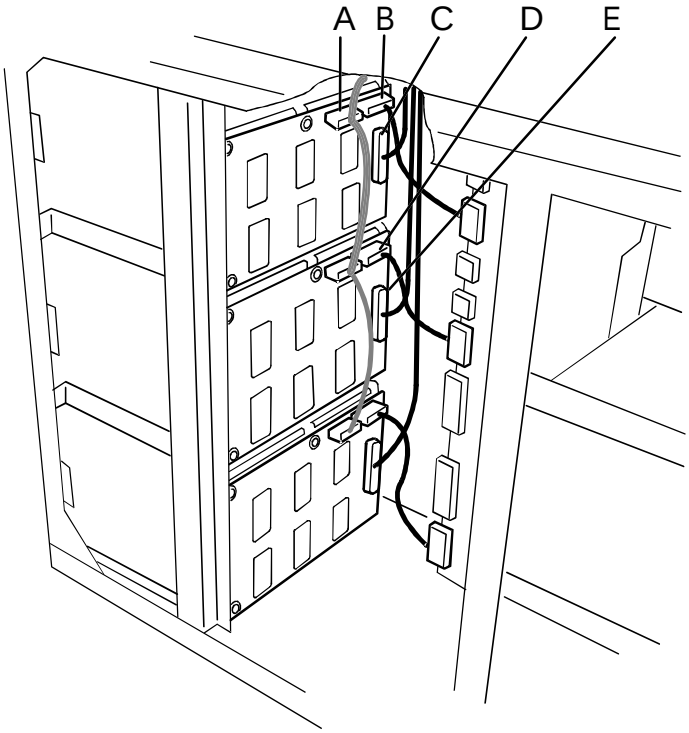
6. Connect a signal cable to the back of the new hard drive cage (see Figure 5-31, C or E)).

   Note: For the signal cable be certain that you are using the 68-pin SCSI signal cable. This cable comes from the controller at the top of the server to the hard drive cage.

7. Reinstall the right side panel, the top cover, and the right front door. Power on the system.

8. If you are installing a controller for the additional hard drive cage, refer to *Installing an Option Board* in this chapter.

Figure 5-31. Installing Hard Disk Drive Cage Cables



A Status cable (P03)

B Power cable (P01) for 3rd cage

C Signal cable (P02) for 3rd cage

D Power cable (P01) for 2nd cage

E Signal cable (P02) for 2nd cage

Chapter 6

Problem Solving

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Status LED 20

This chapter helps you identify and solve problems that may occur during system installation or while using your system. The first section of this chapter tells you how to reset your system in the event of problems. The next few sections provide troubleshooting checklists and procedural steps that help you isolate specific system problems. The last sections include error message and status LED user information.

Warning: The DC push-button on/off switch on the front panel does not turn off the system AC power. Before doing the procedures in this chapter, make sure that your system is powered off and unplug the AC power cord from the back of the chassis. Failure to disconnect power before opening your system can result in personal injury and equipment damage

Resetting the System

There are two ways to reset the system:

Reset button

Pushing the reset button clears the system memory, restarts the POST, and reloads the operating system.

Power off/on

Turning the power off and then on with the push-button switch on the front panel has the same effect as pushing the reset button, except that power is halted to all peripherals.

Troubleshooting Checklists

The following subsections provide troubleshooting checklists for problems that occur at initial system startup, when you run new application software, and after the system hardware and software have been running correctly.

Initial System Startup

Problems that occur at initial system startup are usually caused by incorrect installation or configuration. Hardware failure is a less frequent cause. If you have problems during initial system startup, check the following:

- Is the system power cords properly connected to the system and plugged into a NEMA 5-15R outlet (100-120 V ac) or a NEMA 6-15R outlet (200-240 V ac)?
- Is AC available at the wall outlets?
- Is the power on/off push-button switch on the front panel in the ON position (power on LED should be lit)?
- Are all cables correctly connected and secured?
- Are all the PCI/ISA option boards fully seated in their connector slots on the system board?
- Are all jumper settings on the system I/O board correct? For jumper information, see the *Configuring Your System* chapter.
- Are all jumper and switch settings on option boards and peripheral devices correct? If applicable, ensure that there are no conflicts; for example, two option boards sharing the same interrupt.
- Are all DIMMs fully seated and installed correctly? Refer to the *Upgrades and Options* chapter for installation instructions.

- Are all removable media drives and disk drives installed correctly? Refer to the *Upgrades and Options* chapter.
- If the system has a hard disk drive, is it properly formatted or defined?
- Is the operating system properly loaded? Refer to the operating system documentation.
- Are all drivers properly installed? For information about installing drivers, refer to your network operating system configuration guide.
- Are the configuration settings in Setup and the Resource Configuration Utility (RCU) correct? For information about running these utilities, refer to the *Configuring Your System* chapter.

If the above items are all correct, but the problem reoccurs, refer *to Additional Troubleshooting Procedures* in this chapter.

Running New Application Software

Problems that occur when you run new application software are usually related to the software. Faulty equipment is much less likely, especially if other software runs correctly. If you have problems while running new application software, check the following:

- Does the system meet the minimum hardware requirements for the software? Refer to the software documentation.
- Is the software an authorized copy? Unauthorized copies often do not work. Obtain an authorized copy of the software.
- If you are running the software from a floppy disk, is it a good copy?
- If you are running the software from a hard disk drive, is the software correctly installed? Were all necessary procedures followed and files installed?
- Are the correct device drivers installed?
- Is the software correctly configured for the system?
- Are you using the software correctly?
- Try a different copy of the software to see if the problem is with the copy you are using.
- If other software runs correctly on the system, contact your vendor about the failing software.

If the problems persist with the software, contact the software vendor's customer service representative.

After System Has Been Running Correctly

Problems that occur after the system hardware and software have been running correctly often indicate equipment failure. However, many situations that are easy to correct can also cause such problems. If you have problems after the system has been running correctly, check the following:

- If you are running the software from a floppy disk, try a new copy of the software.
- If you are running the software from a hard disk drive, try running it from a floppy. If the software runs correctly, there may be a problem with the copy on the hard disk. Reinstall the software on the hard disk drive and try running it again. Make sure all the necessary files are installed.
- If the problem recurs, you may need to reformat the hard disk drive. The drive, the drive controller, or the system boards may be defective.
- If the problems are intermittent, there may be a loose cable, dirt in the keyboard (if keyboard input is incorrect), a marginal power supply, or other random component failures.
- If you suspect that a transient voltage spike, power outage, or brownout might have occurred, reload the software and try running it again. Symptoms of voltage spikes include a flickering video display, unexpected system reboots, and the system not responding to user commands.

  Note: Voltage spikes can corrupt or destroy data files on the drive. If you are experiencing voltage spikes on the power line, install a surge suppresser between the power outlet and the system power cords.

If the problem recurs after you have checked and corrected all of the above items, refer to *Additional Troubleshooting Procedures* in this chapter.

Additional Troubleshooting Procedures

This section provides a more detailed approach to diagnostic testing and identification of a problem and locating its source.

Error Checking

Each time you turn on the system, the POST runs automatically and checks the system boards, processors, memory, keyboard, and most installed peripheral devices.

If POST finds an error, it displays an error message. Refer to the *Error Message* section in this chapter for an explanation of each error message.

Troubleshooting Guide

Use the following troubleshooting procedures to help you identify a problem. These general procedures lead you through the following:

- Preparing the system for diagnostic testing
- Monitoring POST while it is running
- Verifying proper operation of key system LEDs
- Confirming loading of the operating system.

Preparing the System for Diagnostic Testing

To prepare the system for diagnostic testing, perform the following:

Notice: Before disconnecting any peripheral cables from the system, turn off the system and any external peripheral devices. Failure to do so can cause permanent damage to the system and/or the peripheral devices.

1. Turn off the system and all external peripheral devices. Disconnect all devices from the system except the keyboard and video monitor.

2. Make sure the system power cords are plugged into a properly grounded AC outlet.

3. Make sure your video display monitor and keyboard are correctly connected to the system. Turn on the video monitor. Set its brightness and contrast controls to at least two-thirds of their maximum ranges (refer to the documentation supplied with your video display monitor).

4. If the operating system normally loads from the hard disk drive, make sure there is no diskette in drive A. Otherwise, place a diskette containing the operating system files in drive A.

5. Turn on the system. If the power indicator LED does not light, refer to *Power Light Does Not Light* found later in this chapter.

Monitoring POST while it is running

Each time you turn on the system, the power-on self-test (POST) runs automatically and checks the system board, CPU, memory, keyboard, and most installed peripheral devices.

During the memory test, POST displays the amount of memory that it is able to access and test. Depending on the amount of memory, it may take several minutes to complete the memory test. When the memory test completes, the following is displayed:

Press <F2> to enter SETUP

Press <F2> if you want to run BIOS Setup. When the utility appears, follow the instructions on your monitor to configure BIOS. See Chapter 4, *Configuring Your System*. If you do not press <F2>, the above message remains for a few seconds and the boot process continues.

When this message appears:

Press <Ctrl><A> for SCSISelect™ Utility!

Press <Ctrl+A> if you want to configure SCSI devices in your system. When the utility appears, follow the instructions on your monitor to configure the SCSI host adapter settings and run the SCSI disk utilities. See Chapter 4, *Configuring Your System*. If you choose not to run the SCSISelect Utility, the boot process continues.

If POST finds an error, it displays an error message. This information is useful to your service representative. Refer to the *Error Message* section in this chapter for an explanation of each error code.

The BIOS indicates errors by writing an error code to the PS/2-standard logging area in the Extended BIOS Data Area, and by displaying a message on the screen, which is sometimes preceded by the POST Error Code. The error code will also be logged to the Event Logging area.

Verifying Proper Operation of Key System Indicators

As POST determines the system configuration, it tests for the presence of each mass storage device installed in the system. As each device is checked, its activity indicator should turn on briefly. Check for the following:

- Does the diskette drive activity indicator turn on briefly. If not, refer to Diskette *Drive Activity Indicator Does Not Light* in this chapter.
- If a second diskette drive is installed, does its activity indicator turn on briefly. If not, refer to *Diskette Drive Activity Indicator Does Not Light* in this chapter.
- If there is a hard disk drive or SCSI devices installed in the system, does the hard disk drive activity indicator turn on briefly. If not, refer to *Hard Disk Drive Activity Indicator Does Not Light* in this chapter.

Confirming Loading of the Operating System

Once the system boots up, the operating system prompt appears on the screen. The prompt varies according to the operating system. If the operating system prompt does not appear, refer to *Problems With Application Software* found later in this chapter.

Specific Problems and Corrective Actions

This section provides possible solutions for the following specific problems:

- Power LED does not light
- System cooling fans do not rotate
- No characters appear on screen
- Characters on the screen appear distorted or incorrect
- Floppy disk drive access LED does not light
- Hard disk drive access LED does not light
- The RCU does not boot
- Problems with application software.

Try the solutions in the order given. If you cannot correct the problem, contact your service representative for assistance.

Power LED Does Not Light

Check the following:

- Is the system operating normally? If so, the power LED is probably defective.
- Are there other problems with the system? If so, check the items listed under System Cooling Fans Do Not Rotate.

System Cooling Fans Do Not Rotate

Note: In addition to the cooling fans that are an integral part of each power supply, the system has an option board fan and two CPU fans. The two CPU fans are redundant in configuration. This means if one fan fails, its associated fan changes its rotating speed to high. There are no serviceable components inside the power supply. If the power supply is opened, the manufacturer's warranty is voided.

Check the following:

- Is AC power available at the wall outlet?
- Are the system power cords properly connected to the system and the AC wall outlet?
- Are the power connector for the cooling fan connected to the system I/O board (option board fan) and the CPU base board (CPU fans)?
- Is the front panel power on indicator lit?

If the switches and connections are correct and the power outlet is functioning, the power supply has probably failed. Contact your service representative for assistance.

No Characters Appear On Screen

Check the following:

- Is the riser card fully seated in the system I/O board connector? The riser card is the small card that the mouse and keyboard plug into.
- Is the keyboard working?
- Is the video display plugged in and turned on?
- Are the brightness and contrast controls properly adjusted?
- Are the video display switch settings correct?
- Is the video display signal cable properly installed?

If you are using an option video controller board, perform the following:

1. Verify that the video controller board is fully seated in the system board connector.
2. Run the RCU to disable the onboard video controller.
3. Reboot the system for changes to take effect.

If there are still no characters on the screen after you reboot the system, contact your service representative or authorized dealer for assistance.

Characters are Distorted or Incorrect

Check the following:

- Are the brightness and contrast controls properly adjusted on the video display? Refer to the documentation supplied with your video display.
- Are the video display signal and power cables properly installed?
- If the problem persists, the video display may be faulty or it may be the incorrect type. Contact your service representative for assistance.

Floppy Disk Drive Activity LED Does Not Light

Check the following:

- Are the floppy disk drive power and signal cables properly installed?
- Are all relevant switches and jumpers on the floppy disk drive set correctly?
- Is the floppy disk drive properly configured in Setup?

If you are using the onboard floppy disk controller, use Setup to make sure that Onboard Floppy is set to Enabled. Conversely, to use an optional fixed/floppy disk controller, make sure that Onboard Floppy is set to Disabled. For information about running Setup, refer to the *Configuring Your System* chapter.

If the problem persists, there may be a problem with the floppy disk drive, system I/O board, or drive signal cable. Contact your service representative for assistance.

Hard Disk Drive Activity LED Does Not Light

If you have installed one or more hard disk drives in your system, check the following:

- Is the optional disk controller board fully seated in the system I/O board connector?
- Is the disk drive seated properly?
- Are the jumpers on the system I/O board set correctly?
- Is the hard disk activity LED cable connector plugged into the optional controller board, if present?

If you received error messages, refer to the *Error Message* section for information about error messages.

If the problem persists, there may be a problem with the hard disk drive, the optional controller board, system I/O board, drive signal cable, or LED connector. Contact your service representative for assistance.

Problems with Application Software

If you have problems with application software, perform the following:

- Verify that the software is properly configured for the system. Refer to the software installation and operation documentation for instructions on setting up and using the software.
- Verify a different copy of the software to see if the problem is with the copy you are using.
- Make sure all cables are installed correctly.
- Verify that the system I/O board jumpers are set correctly. Refer to the *Configuring Your System* chapter for jumper settings.
- If other software runs correctly on the system, contact your vendor about the failing software.

If the problem persists, contact the software vendor's customer service representative for assistance.

Error Message

The server status is displayed in 16 digits of alphanumeric characters on the liquid crystal display (LCD) on the front of the server. Use this indication together with the status LED indications to solve problems that may occur while using your system.

Note: Record the indication of LCD before contacting your service representative. An alarm indication is useful when maintaining the server.

Alarm Indication during POST

Each time you turn on the system, the power-on self-test (POST) runs automatically. During POST, the test that is being executed is displayed on the LCD. If the same code has been displayed for more than 5 minutes, an occurrence of fatal error is assumed. Record the code displayed on LCD, then contact your service representative.

When an alarm that restricts operation (such as degradation function) or can be recovered by re-setup has occurred, an error code is displayed on the LCD. (An error message is also displayed on the display unit.)

Table 6-1 lists the error codes and messages you may see during POST.

Table 6-1. POST Error Codes and Messages

Code	Error message	Description
0710	WARNING: CPU with error taken Off-line.	A CPU error was detected and the CPU is being degraded.
0718	ERROR: Forced to use CPU with error.	A CPU error was detected.
0720	WARNING: DIMM groups have been disabled.	A memory error was detected and memory is being degraded.
0728	ERROR - DIMM group with error is enabled.	A memory error was detected.
0B00	Keyboard controller error	A keyboard controller error was detected.
0B01	Keyboard Error	A keyboard error was detected.
0B02	System cache error - Cache disabled	A CPU cache error was detected.
0B03	System battery is dead - Replace and run SETUP	NvRAM battery is worn out.
0B04	System CMOS checksum bad - run SETUP	Start the Setup utility to correctly set the CMOS.
0B05	Monitor type does not match CMOS - run SETUP	The connected display unit does not match the internal setting.
0B06	Stuck Key	A key is continuously pressed.
0B07	System timer error	A system timer error was detected.
0B08	Real time clock error	A realtime clock error was detected.
0B09	Previous boot incomplete - default configuration used (xx)	Previous boot was not terminated normally.
0B0A	Keyboard Locked - Unlock key switch	Keyboard is locked.
0B0B	Diskette drive A error	An error was detected on the floppy disk drive A.
0B0D	address conflict	An error was detected on the standard device and/or extended board.
0B0E	combination not supported	An error was detected on the standard device and/or extended board.
0B0F	IO device IRQ conflict	IRQs of I/O devices do not match.
0B14	System RAM failed	A memory error was detected.
0B15	Shadow RAM failed	A memory error was detected.
0B16	Extended RAM failed	A memory error was detected.
0B17	Failing Bits	A memory error was detected.
0B1A	Missing or Invalid NVRAM taken	NvRAM value is illegal.
0B1B	PCI System Error on Bus/Device/Function	A error was detected on PCI bus.
0B1C	PCI Parity Error on Bus/Device/Function	A error was detected on PCI bus.
0B1E	Unsupported CPU detect.	CPU step was incorrect.
0B1F	System Temperature is exceeded limit.	An abnormal temperature was detected.
0B23	WARNING: CPUs with different L2 cache size are found.	CPUs of different cache size were detected.
0B30	Fan 1 Alarm occurred.	A failure on option slot fan was detected.
0B31	Fan 2 Alarm occurred.	A failure on CPU fan was detected.

Table 6-1. POST Error Codes and Messages (continued)

Code	Error message	Description
0B40	Invalid System Configuration Data - run configuration utility	System configuration is illegal.
0B41	System Configuration Data Read Error	Read error of system configuration data.
0B42	Resource Conflict	Resource such as IRQ or memory conflicts.
0B43	Warning: IRQ not configured.	IRQ conflicts.
0B44	Expansion Rom not initialized	Initialization of expansion ROM failed.
0B45	System Configuration Data Write Error	Write error of system configuration data.
—	BIOS not installed	No bootable device is found on Fast SCSI2 bus channel.
—	Warning: The system detected on illegal CPU Card combination.	Combination of CPU cards is invalid.
—	A system error has occurred.	An error occurred on system.

Alarm Indication during Operation

Table 6-2 lists the alarm indications displayed on LCD during server operation.

Table 6-2. Operational Error Codes and Messages

Error Indication		Description
CPU Err #YZ (Y:1-2)(Z:1-3)	0BYZ	An error was detected on CPU #YZ.
CPU Error		An error was detected on CPU.
CPU Thermal (X:1-2)(Y:1-3)	0BXY	CPU #XY overheated.
CPU Thermal		CPU overheated.
ISA Error (X: 1-2)	050X	An error was detected on ISA board slot #X.
ISA Error		An error was detected on ISA boards.
HDD Thermal	1060	The internal hard disks overheated.
Memory Err (X:1-8) (Y:1-2)	22XY	A DIMM error was detected. X = bank. Y = 1 (lower) or 2 (upper)
PCI PERR#		A parity error was detected on PCI boards.
PCI PERR#	0901	A parity error was detected on PCI boards slot #11 or #12.
PCI PERR#	0902	A parity error was detected on PCI boards slot #21, #22 or #23.
PCI PERR#	0903	A parity error was detected on PCI boards slot #31, #32, #33 or #34.
PCI SERR#		An error was detected on PCI boards or system I/O board.
PCI SERR#	0A01	An error was detected on PCI boards slot #11 or #12.
PCI SERR#	0A02	An error was detected on PCI boards slot #21, #22 or #23.
PCI SERR#	0A03	An error was detected on PCI boards slot #31, #32, #33 or #34.
POW Major B	10F0	An error was detected on the system power supply.
POW Major E	10F1	An error was detected on the disk expansion cabinet power supply.
Power +3.3V	1012	An abnormal +3.3V was detected.
Power +5V	1013	An abnormal +5V was detected.
Power +12V	1014	An abnormal +12V was detected.
Power -12V	1015	An abnormal -12V was detected.
Power -5V	1016	An abnormal -5V was detected.
Power CPU#11	1010	An abnormal voltage was detected for CPU #11.
Power CPU#12	1011	An abnormal voltage was detected for CPU #12.
Power CPU#21	1020	An abnormal voltage was detected for CPU #21.
Power CPU#22	1021	An abnormal voltage was detected for CPU #22.
Thermal Hi	10X7 (X:1-2)	A cabinet overheated error was detected.
WDT-Timeout	0C00	The watchdog timer timed out.
Unknown SMI		An illegal interrupt occurred.

CPU Error Messages

The system can have up to six processors. If an error occurs in a processor (or VRM), the processor (or VRM) location is displayed on the LCD as follows:

CPU #11	1st primary CPU board processor
CPU #12	2nd primary CPU board processor
CPU #13	3rd primary CPU board processor
CPU #21	1st secondary CPU board processor
CPU #22	2nd secondary CPU board processor
CPU #23	3rd secondary CPU board processor

In addition, it is also possible to know the CPU location in the BIOS Setup utility (by CPU Configuration in the Advanced menu).

Memory Error Messages

The system can have up to sixteen DIMMs. If an error occurs in memory, the DIMM location is displayed on the LCD as a combination of two numerals specifying the bank and socket. The numerals in the error message correspond to the lower two digits of the number of the relevant DIMM memory socket on the CPU base board.

In addition, it is also possible to know the DIMM location in the BIOS Setup utility (by Memory Configuration in the Advanced menu).

Status LED

This section lists and describes the various system and disk status LED indicators and provides a user response for the various status conditions. Once your server is up and running, you can monitor server operation through the system status LED panel indicators and the SCSI device status LED panel indicators. See Table 6-3 and Table 6-4 for a list and description of the LED indicators and Table 6-5 for a list of the system status abnormal conditions.

If any problems persist, contact your service representative for assistance.

Table 6-3. System Status LED Indicators

LED	Status	Description	Response
Power	Off	Power OFF	None required (normal)
	Green	Power ON	None required (normal)
	Amber	System power supply failure	Replace failed power supply module.
Status	Off	Power OFF	None required (normal)
	Green	No alarms	None required (normal)
	Amber	Abnormal condition (see Table 2-3).	Check condition.
Disk	Off	Not accessing disk drives	None required (normal)
	Amber	Internal disk drive failure	Check disk drive status LEDs
	Green	Accessing disk drives	None required (normal)

Table 6-4. Disk Drive Status LED Panel Indicators

LED	Status	Description	Response
Disk Drive Present	Off	Disk drive not present	None required (normal)
	Green	Disk drive present	None required (normal)
Disk Drive Activity	Off	Not accessing disk drive	None required (normal)
	On	Accessing disk drive	None required (normal
Disk Drive Status	Off	No alarms	None required (normal)
	Amber	Disk drive failure	Replace disk drive.

Table 6-5. System Status Abnormal Conditions

LED (Amber)	Conditions
System Status	Chassis intrusion (front cover) Unit fan alarm Memory multi-bit error (SERR) P6 bus error (SERR) Thermal sensor Temperature Voltage CPU thermal trip PCI PERR# (OPB/ESC detect) PCI SERR# CPU internal error WDT IOCHK

Appendix A

System Cabling

Contents

Before You Begin 1

Static Precautions 1

SCSI Bus Configuration 2

RAID Configuration 4

- Installing the RAID Controller 4
- Configuring the RAID Controller 6

This appendix contains information and procedures on cabling configurations used in your system. The configurations include:

- SCSI bus
- RAID controller.

Before You Begin

Warning: The DC push-button on/off switch on the front panel does not turn off the system AC power. Before doing the procedures in this chapter, make sure that your system is powered off and unplug the AC power cord from the back of the chassis. Failure to disconnect power before opening your system can result in personal injury and equipment damage

Static Precautions

An electrostatic discharge (ESD) can damage disk drives, option boards, and other components. You can provide ESD protection by wearing an antistatic wrist strap attached to chassis ground when handling system components.

Electronic devices can be easily damaged by static electricity. To prevent damage, keep them in their protective packaging when they are not installed in your system.

SCSI Bus Configuration

Your system is cabled using the dual ultra wide SCSI-2 controller (Adaptec® AIC-7895) on the system I/O board. Channel B of this on-board controller is used to control up to four peripherals (CD-ROM and tape drives) in the removable media drive bays. On the HX4100 server, channel A can be used to control up to four hard disk drives in a hot-swap hard drive cage. A 3 1/2-inch diskette drive is installed in all systems and interfaces separately to the system I/O board. Figure A-1 is a diagram of the SCSI cabling.

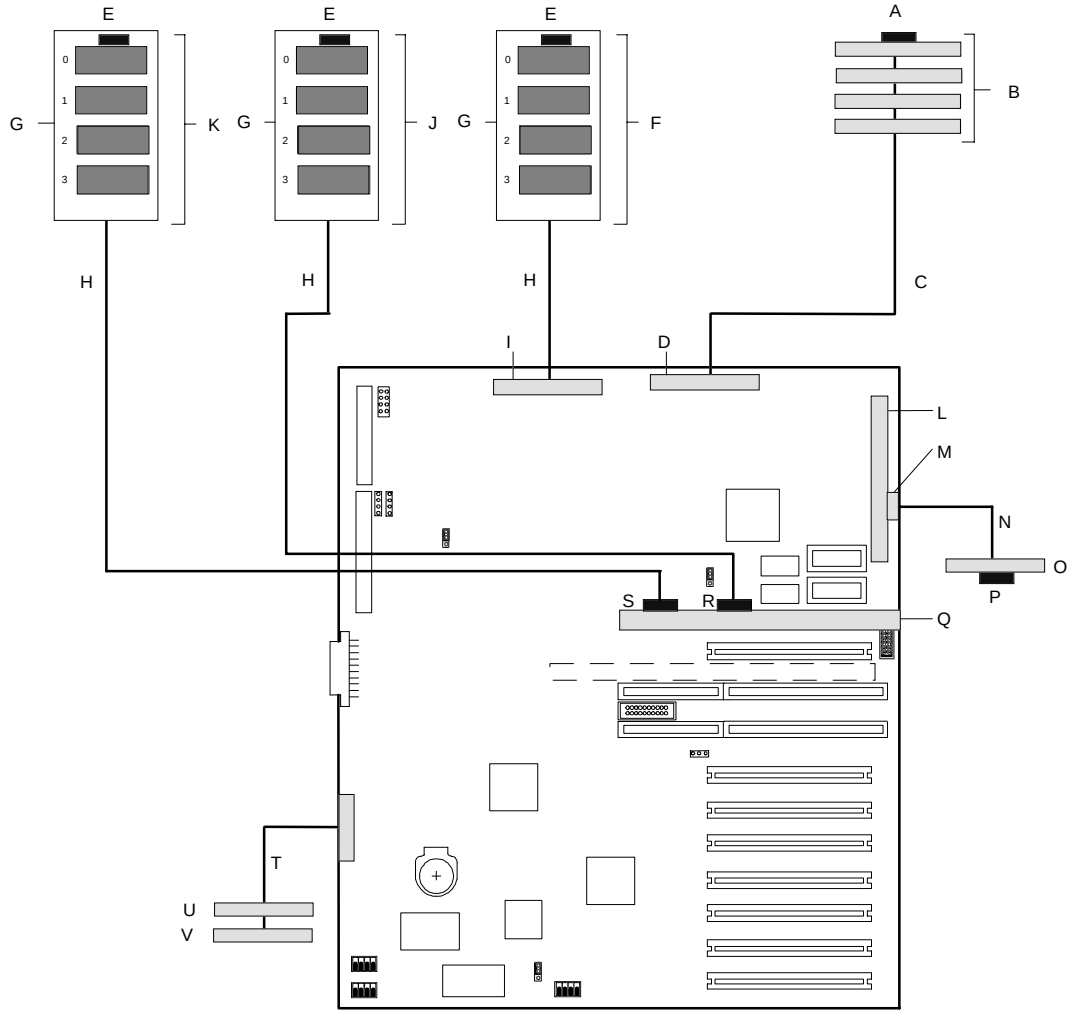
The narrow SCSI interface cable is connected to the SCSI connector on the system I/O board (Figure A-1, D). This cable connects to the rear of the SCSI removable media peripherals (if present). The last drive on the daisy chain cable must have it's internal SCSI terminators installed (Figure A-1, A).

On the HX4100 server, the ultra wide SCSI interface cable is connected to the SCSI connector on the system I/O board (Figure A-1, I). This cable connects to the SCSI distribution back panel at the rear of the hard disk drives (Figure A-1, F) to control up to four disk drives. Termination for the hard disk drives is provided on the SCSI distribution panel (Figure A-1, E). To control more then four disks, an optional SCSI controller can be added (Figure A-1, Q).

The onboard narrow SCSI controller also includes a connector located at the rear of the system for connecting external SCSI devices (Figure A-1, M). Three important rules must be followed if you connect external narrow SCSI devices:

- A maximum of seven narrow SCSI devices may be connected to the onboard SCSI controller. For example if three SCSI devices in the system cabinet are connected to the SCSI bus, only four external narrow SCSI devices can be connected.
- The maximum cable length for all narrow devices connected to the controller is 1 meter (39 inches).
- The last external narrow SCSI device must be terminated. Active termination is recommended.

Figure A-1. Standard System Cable Configuration



A. Device internal SCSI termination resister
B. Narrow SCSI devices in upper peripheral bays
C. Narrow SCSI interface cable
D. SCSI channel B connector
E. SCSI back plane terminator
F. Ultra wide SCSI disks in lower cage
G. Distribution back plane
H. Wide SCSI interface cable
I. SCSI channel A connector
J. Ultra wide SCSI disks in middle cage
K. Ultra wide SCSI disks in upper cage
L. I/O riser board
M. Narrow SCSI connector (50 pin)
N. External narrow SCSI cable
O. External narrow SCSI device
P. SCSI terminator
Q. Dual SCSI controller in PCI slot #11 P2 (optional)
R. Channel A cable connector
S. Channel B cable connector
T. Diskette interface cable
U. 2nd 3 1/2-inch device (optional)
V. 3 1/2-inch diskette drive

RAID Configuration

One of the standard features of the HX6100 and one of the options available for the HX4100 is the three channel DAC960 (Redundant Array of Inexpensive Devices (RAID) Controller board, which gives your system the added security of fault tolerance. If your system has RAID at the time you order it, the system is pre-cabled at the factory (see Figure A-2).

If you are adding the DAC960 controller to an existing system, you must install, cable, and configure the controller. The following subsections describe these procedures.

Installing the RAID Controller

If you are adding the DAC960 controller to an existing system, you must install and cable the controller. Refer to the *Installing an Option Board* section in Chapter 5 of this guide to install the controller in PCI slot P2. Once you have installed the controller, perform the following cabling procedure.

1. Power off the system and remove the right front door, the top cover, and the right side panel as described in Chapter 5 of this guide.

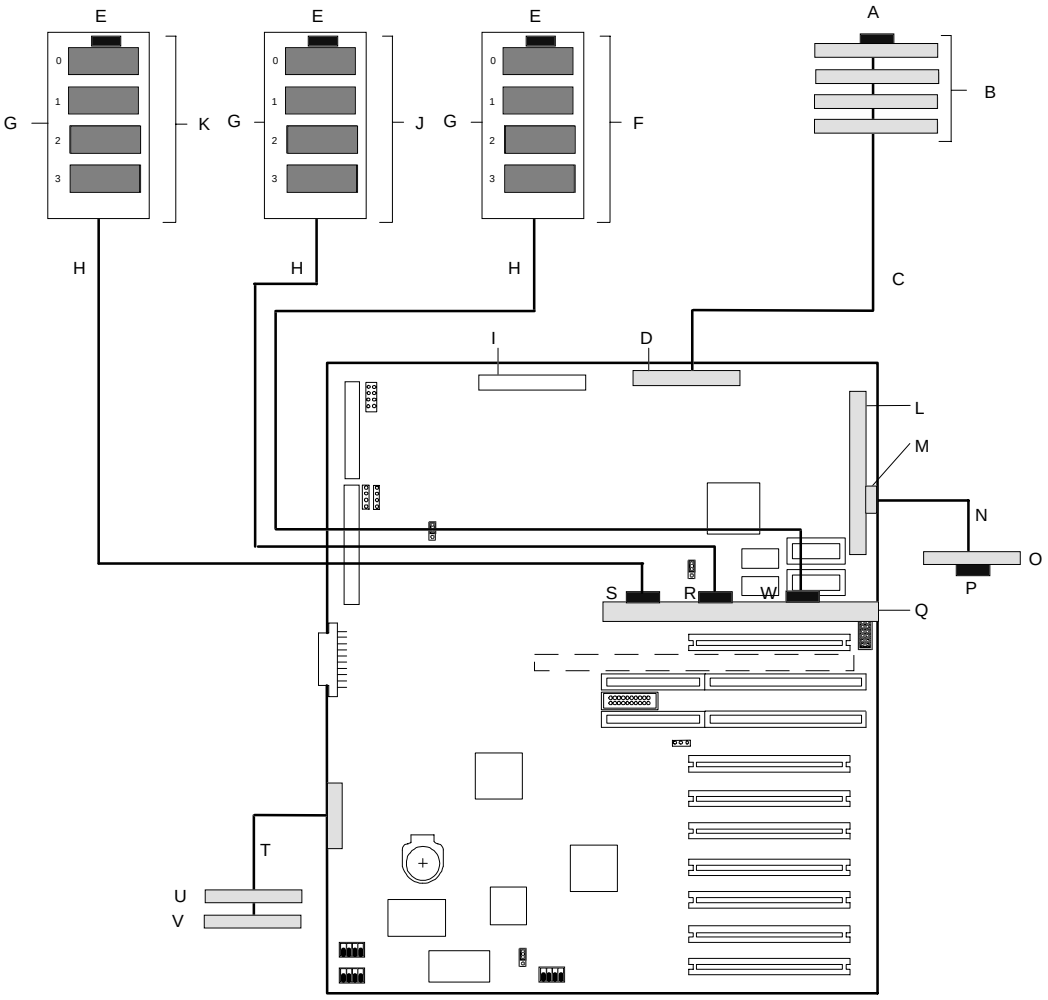
2. If you need to install any hard drive cages, refer to the *Installing a Hard Disk Drive Cage* section in Chapter 5 of this guide.

3. Carefully remove the ultra wide SCSI interface cables from their connectors on either the system I/O board (Figure A-1, I) or the optional SCSI controller (Figure A-1, Q).

4. Reconnect the ultra wide SCSI interface cable(s) (just removed) to the RAID controller board (Figure A-2).

5. Reinstall the right side panel, the top cover, and the right front door. Power on the system.

Figure A-2. RAID Cable Configuration



A. Device internal SCSI termination resister
B. Narrow SCSI devices in upper peripheral bays
C. Narrow SCSI interface cable
D. SCSI channel B connector
E. SCSI back plane terminator
F. Ultra wide SCSI disks in lower cage
G. Distribution back plane
H. Wide SCSI interface cable
I. SCSI channel A connector
J. Ultra wide SCSI disks in middle cage
K. Ultra wide SCSI disks in upper cage
L. I/O riser board
M. Narrow SCSI connector (50 pin)
N. External narrow SCSI cable
O. External narrow SCSI device
P. SCSI terminator
Q. Three channel RAID controller in PCI slot #11 P2 (optional)
R. Channel 1 cable connector
S. Channel 2 cable connector
T. Diskette interface cable
U. 2nd 3 1/2-inch device (optional)
V. 3 1/2-inch diskette drive
W Channel 0 cable connector

Configuring the RAID Controller

The DACCF utility is included with the RAID controller. This configuration utility allows you to configure your disk array before installing your network operating system. The DAC960 RAID controller supports various versions of RAID technology (referred to as RAID levels). To use any RAID level, you must configure the RAID controller using the DACCF configuration utility prior to installing your Network Operating System. For an explanation of this utility, refer to the *DACCF Utilities Installation Guide and User Manual* that was shipped with the server. Chapter 2 of the manual (*Configuration Strategies)* describes RAID technology and provides tips on making your array perform well in your specific application. Chapter 3 (*Preparing the Array)* covers array hardware preparation, configuration, and initialization. After completing the steps in chapter 3, you can install your Network Operating System.

If you want to be able to remotely (from a PC client) configure the array; increase array capacity online; or monitor statistics on disk and controller activity, you must install the Global Array Manager (GAM) option that was provided with your RAID subsystem. The GAM option includes diskettes and user documentation. Use of GAM is documented in the *Global Array Manager 2 Server Installation Guide*. Increasing array capacity is covered in the *MORE User Guide*. This user guide covers enhancements to both the Global Array manager and DACCF utilities software that implement online RAID expansion (MORE) technology.

Appendix B

Memory Configurations

Contents

Memory DIMM Configurations..... 1

Memory DIMM Configurations

The CPU base board contains sixteen 168-pin DIMM sockets for a total of up to 4 GB of system memory, using 256MB DIMMs. See Figure B-1. DIMM sockets on the board are organized as eight 72-bit wide (64-bit wide data path with 8 parity bits) banks. Parity generation/checking is provided for each byte. DIMM sockets accept 168-pin single- or double-sided DIMMs. A bank must be populated using identical DIMMs. DIMMs may vary in size from one bank to the other, but all DIMMs must be the same speed. Timing requires 60 ns fast page devices.

A memory DIMM upgrade kit consists of 2 identical (of the same size and type) DIMMs defined as:

- 2 x 64MB DIMMs = 128MB
- 2 x 128MB DIMMs = 256MB
- 2 x 256MB DIMMs = 512MB.

The first bank of DIMMs should be installed in sockets P06 and P08. When you install additional DIMMs, you must start with bank 2 and continue to bank 8. When you remove DIMMs, you must start with the highest populated bank of DIMMs. Table B-1 lists the distribution of DIMMs for system memory configurations that maximize socket availability, other combinations are possible.

Figure B-1. CPU Base Board DIMM Sockets

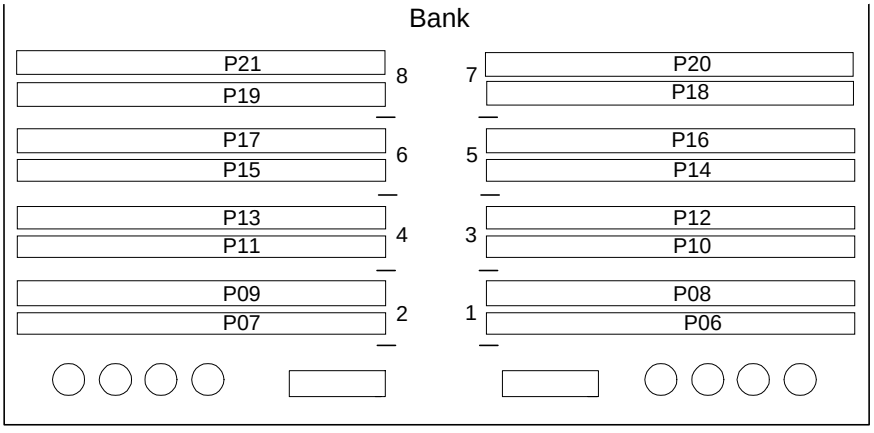


Table B-1. Memory Configurations

Total Memory	Bank #1	Bank #2	Bank #3	Bank #4	Bank #5	Bank #6	Bank #7	Bank #8
128MB	2 x 64MB							
256MB	2 x 128MB							
384MB	2 x 128MB	2 x 64MB						
512MB	2 x 256MB							
640MB	2 x 256MB	2 x 64MB						
768MB	2 x 256MB	2 x 128MB						
896MB	2 x 256MB	2 x 128MB	2 x 64MB					
1024MB	2 x 256MB	2 x 256MB						
1152MB	2 x 256MB	2 x 256MB	2 x 64MB					
1280MB	2 x 256MB	2 x 256MB	2 x 128MB					
1408MB	2 x 256MB	2 x 256MB	2 x 128MB	2 x 64MB				
1536MB	2 x 256MB	2 x 256MB	2 x 256MB					
1664MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 64MB				
1792MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 128MB				
1920MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 128MB	2 x 64MB			
2048MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB				
2176MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 64MB			
2304MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 128MB			
2432MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 128MB	2 x 64MB		
2560MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB			
2688MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 64MB		
2816MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 128MB		
2944MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 128MB	2 x 64MB	
3072MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB		
3200MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 64MB	
3328MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 128MB	
3456MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 128MB	2 x 64MB
3584MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	
3712MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 64MB
3840MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 128MB
4096MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB	2 x 256MB

Glossary

A

AC (Alternating Current) The type of current available in wall outlets. All computers must convert alternating current to direct current to operate. See also DC.

address A label, name, or number that identifies a location in computer memory.

ASCII (American Standard Code for Information Interchange) A standard number assigned to each of the alphanumeric characters and keyboard control code keys to enable the transfer of information between different types of computers and peripherals.

B

backplane slot A connector on the backplane board in desktop computers and expansion boxes that allows you to install circuit cards.

backup A copy of data for safe-keeping. The data is copied from computer memory or disk to a floppy disk, magnetic tape, or other media.

backup battery The battery in your computer that maintains the real-time clock and the configuration information when the computer's power is removed.

base memory An area of memory between 0 and 640 kilobytes.

baud rate The speed with which data is transmitted during serial communication. The computer's operating system and software program must be configured for the same baud rate as the communication device, such as a serial printer. See also bps.

BIOS (Basic Input/Output System) A program stored in flash EPROM or ROM that controls the keyboard, disk drives, video monitor, and other devices. See also flash EPROM, EPROM, and ROM.

bit Derived from BInary digiT, a bit is the smallest unit of information a computer handles. See also byte.

boot The process of loading the operating system into memory.

bps (bits per second) The number of bits transferred in one second during serial communication, such as modem transmission.

byte A group of eight bits.

C

cache memory A very fast, limited portion of RAM set aside for temporary storage of data for direct access by the microprocessor.

CD-ROM drive (Compact Disk ROM drive) A type of mass storage device that reads information from a compact disk.

Centronics port An industry standard parallel port. See also parallel port.

CGA (Color Graphics Adapter) A type of video display system that provides low-resolution text and graphics on TTL monochrome and color monitors.

CMOS (Complimentary Metal-Oxide Semiconductor) A type of low-power integrated circuit used in computers. See also TTL.

COM1 or COM2 The name you can assign a serial port to set or change its address. See also serial port.

command An instruction that directs the computer to perform a particular operation.

configuration The way in which a computer is set up to operate. Some configurable options include CPU speed, serial port designation, and memory allocation.

coprocessor See math coprocessor.

CPU (Central Processing Unit) See microprocessor.

CRT (Cathode-Ray Tube) The type of video display used in monitors for desktop computers.

D

DC (Direct Current) The type of current available in the rechargeable battery packs used in portable computers. See also AC.

default The factory setting your computer uses unless you instruct it otherwise. For example, when powering up, the computer will boot from the default drive.

density The capacity of information (bytes) that can be packed onto a storage device, such as a floppy disk.

device driver A software program that a computer must use to recognize and operate certain hardware, such as a mouse or a video monitor.

disk drive A device that stores data on a hard or floppy disk. A floppy disk drive requires a floppy disk to be inserted; a hard disk drive has a permanently encased hard disk.

DOS (Disk Operating System) See operating system.

DRAM (Dynamic RAM) See RAM.

E

ECC (Error Checking and Correction) A method of detecting and correcting errors.

EEPROM (Electrically Erasable Programmable Read-Only Memory) A type of memory device that stores password and configuration information.

EGA (Enhanced Graphics Adapter) A type of video display system that provides medium-resolution text and graphics on TTL monochrome, color, and enhanced color monitors.

EISA (Extended Industry Standard Architecture) An industry standard for computers and circuit cards that transfer 32 bits of data at a time.

EMI (Electromagnetic Interference).

EMS (Expanded Memory Specification) A method of accessing memory beyond the 640K limit of DOS by exchanging data in and out of main memory at high speeds. Some software requires EMS to operate.

EPROM (Erasable Programmable Read-Only Memory) A type of memory device that is usually used to store system BIOS code. This code can be erased with ultraviolet light, but is not lost when the computer is powered off. See also flash EPROM and ROM.

ESD (Electrostatic Discharge).

expanded memory See EMS.

expansion slot See backplane slot.

extended memory The protected memory above 1M that is directly accessible by the microprocessor through certain utilities and operating systems. This memory is used in computers with 80286, 80386, and 80486 microprocessors.

F

flash EPROM A type of memory device that is usually used to store system BIOS code. This code can be replaced with updated code from a floppy disk, but is not lost when the computer is powered off. See also EPROM and ROM.

floppy disk drive See disk drive.

format The process used to organize a hard or floppy disk into sectors so it can accept data. Formatting destroys all previous data on the disk.

G

(Gigabyte) 1,073,741,824 bytes. See also byte.

H

hard disk drive See disk drive.

hardware The physical parts of your computer, including the keyboard, monitor, disk drives, cables, and circuit cards.

I

IC (Integrated Circuit) An electronic device that contains miniaturized circuitry.

(ISA Configuration Utility) The program that you use to change the configuration of some ISA desktop computers. This program also contains information about the hardware in the computer.

IDE (Integrated Drive Electronics) A type of hard disk drive with the control circuitry located inside the disk drive rather than on a drive controller card.

interface. A connection between the computer and a peripheral device that enables them to exchange data. See also parallel port and serial port.

ISA (Industry Standard Architecture) An industry standard for computers and circuit cards that transfer 16 bits of data at a time.

J

jumper A small electrical connector used for configuration on some computer hardware.

K

(Kilobyte) 1,024 bytes. See also byte.

L

LAN (Local Area Network) A group of computers linked together within a limited area to exchange information.

LCD (Liquid Crystal Display) The type of video display used in portable computers.

LED (Light-Emitting Diode) A small electronic device that glows when current flows through it.

LPT1 or LPT2 The name you can assign a parallel port to specify its address. See also parallel port.

M

(Megabyte) 1,048,576 bytes. See also byte.

math coprocessor An IC that works with the microprocessor to speed up mathematical calculations.

memory The circuitry in your computer that stores data and programs. See also EMS, extended memory, RAM, and ROM.

microprocessor The integrated circuit that processes data and controls the basic functions of the computer.

modem A device used to exchange information with other computers over telephone or data lines.

module A circuit board that plugs into a dedicated connector on the system board in your computer.

mouse A small input device that you guide on a flat surface to control the cursor movement and operation of the computer when using certain software programs.

N

NVRAM (Nonvolatile RAM) A type of RAM that retains its contents even after the computer is powered off. This memory stores EISA configuration information. See also RAM and SRAM.

O

operating system A set of programs that provides the interface between other software programs and the computer.

P

parallel port The connector on the back of your computer that allows the transfer of data between the computer and a parallel device, such as a parallel printer.

partition The process of dividing the storage space on a hard disk into separate areas so that the operating system treats them as separate disk drives.

password A security feature that prevents an unauthorized user from operating your computer. See also EEPROM.

PCI Peripheral Component Interconnect. PCI is a high-performance peripherals I/O bus supporting data transfers of up to 132MB per second.

Pentium A type of microprocessor, with a built-in math coprocessor, cache memory, and memory and bus controllers, that processes and communicates 32 bits of data at a time. This microprocessor also contains power management capabilities.

peripheral A device connected to and controlled by the computer, such as an external disk drive or a printer.

pixel The smallest element that is visible on a video display. The resolution of a video display system is measured in pixels.

POST Power-On-Self-Test.

R

RAM (Random-Access Memory) A temporary storage area for data and programs. This type of memory must be periodically refreshed to maintain valid data, and is lost when the computer is powered off. See also NVRAM and SRAM.

real-time clock The IC in your computer that maintains the time and date.

ROM (Read-Only Memory) A type of memory device that usually is used to store system BIOS code. This code cannot be altered and is not lost when the computer is powered off. See also BIOS, EPROM, and flash EPROM.

RS-232C port An industry standard serial port. See also serial port.

S

save To store information on a floppy disk, hard disk, magnetic tape, or some other permanent storage device.

SCU (System Configuration Utility) The program that you use to change the configuration of your system. This program also contains information about the hardware in your system.

SCSI (Small Computer System Interface) An industry standard interface that provides high-speed access to tape drives, hard disk drives, and other peripheral devices.

serial communication Information sent sequentially, one bit at a time.

serial port The connector on the back of your computer that allows the

	transfer of data between the computer and a serial device, such as a mouse, a modem, or a serial printer.
Setup program	The program that you use to change the configuration of some ISA desktop and notebook computers. This program also contains information about the hardware in the computer.
SMP	(Symmetrical Multiprocessing).
software	Programs with specific functions, such as word processing, data base management, communications, and operating system.
SRAM	(Static RAM) A temporary storage area for data and programs. This type of memory does not need to be refreshed, but it is lost when the computer is powered off. See also NVRAM and RAM.
SVGA	(Super VGA) A type of video display system that provides very high-resolution text and graphics on analog color monitors.
system board	The main circuit board in your computer. It contains most of the connectors and ports.

T

tape drive	A type of storage device using magnetic tape.
TTL	(Transistor-Transistor Logic) A type of integrated circuit used in computers. See also CMOS.

V

VGA	(Video Graphics Array) A type of video display system that provides high-resolution text and graphics on analog color monitors.

Equipment Log

Use this equipment log form to record pertinent information about your system. You will need some of this information to run the System Configuration Utility. Be sure to update the equipment log when you add options.

Record the model and serial numbers of the system components, dates of component removal or replacement, and the name of the vendor from whom the component was purchased. Be sure to record the same information for any components added to the system, such as hard disk drives, add-in boards, or printers.

Record the model and serial numbers of the unit and system baseboard. The model and serial numbers of the system unit are recorded on a label attached to the rear of the unit. The serial number of the baseboard is located along the left side of the board, near the PCI expansion slot covers.

The location of serial numbers on add-in boards, hard disk drives, and external equipment, such as video displays or printers, varies from one manufacturer to another. Literature accompanying these products should illustrate or describe the location of model and serial numbers.

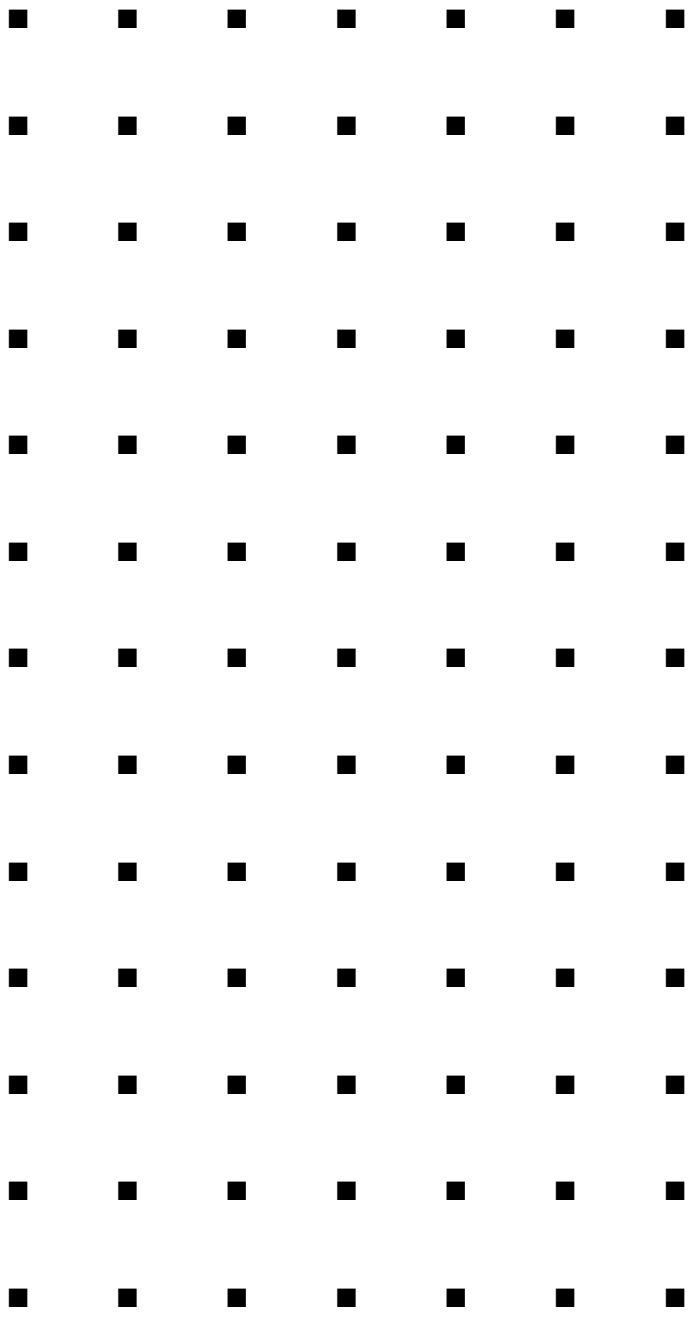
Equipment Log

Component	Manufacturer Name and Model	Serial Number (if available)	Date Installed
Server			
CPU 1			
CPU 2			
CPU 3			
CPU 4			
CPU 5			
CPU 6			
DIMMs			
Video Mem. DRAM			
Diskette Drive A			
Diskette Drive B			
Tape Drive 1			
Tape Drive 2			
Tape Drive 3			
CD-ROM Drive 1			
CD-ROM Drive 2			
CD-ROM Drive 3			
Hard Disk Drive 1			
Hard Disk Drive 2			
Hard Disk Drive 3			
Hard Disk Drive 4			
Hard Disk Drive 5			
Hard Disk Drive 6			
Hard Disk Drive 7			
Hard Disk Drive 8			

(continued)

Equipment Log (continued)

Component	Manufacturer Name and Model	Serial Number (if available)	Date Installed
Hard Disk Drive 9			
Hard Disk Drive 10			
Hard Disk Drive 11			
Hard Disk Drive 12			
Optional SCSI Controller			
Optional RAID Controller			
Network Controller 1			
Network Controller 2			
Monitor			
Keyboard			
Mouse			
External SCSI Peripherals			



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